

INTEGRAL REVIEW

A Transdisciplinary and Transcultural Journal For New Thought, Research, and Praxis

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¹ This newsletter and O'Fallon's notes from the field were originally links to external websites. For our new website and this full issue, we chose to include them as pdfs. Thus there are not page numbers here for them.

* The asterisks indicates that the article by Torbert and Livne-Tarandach, while appearing in the peer review section, is also an essential component of the special section of this issue.



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Editorial

Integral Review (IR) continues to grow and evolve. For one thing we have begun to share the Editorial role among the Associate Editors, and Jonathan has handed to me (Tom Murray) the enjoyable task of welcoming you to our December 2009 issue. In this issue we are pleased to see, in addition to articles on a broad range of topics that I will describe below, a significant number of responses to Stein and Heikkinen's article in our June 2009 issue. I will present an extended overview of those responses and briefly discuss some of the threads they cover. First, I will begin with some news and announcements.

We would like to welcome two new members to our Editorial Board: Jennifer Gidley and Steve Wallis. Jennifer has previously published her work on evolving planetary consciousness with IR, and her extended article continues to be one of our most frequently downloaded. Steve Wallis has also published with us, and has also taken the initiative to edit, along with IR Editorial Board member Mark Edwards, a special issue of IR on *Developing Perspectives for Advancing Metatheory and Theory*. Prior to that, we will publish a special issue on *Toward Developing Politics and the Political*, edited by IR Associate Editors Sara Ross and Thomas Jordan. Later will be another, *Research Across Boundaries – Advances in Theory-building*, guest-edited by Markus Molz and Mark Edwards. If you want to propose a special issue for *Integral Review* you can inquire at ireditors@integral-review.org.

Many of us associated with *Integral Review* are looking toward the Integral Theory Conference next year at JFK University, and have submitted proposals. We also have plans in the works to host a gathering for friends of IR at or prior to the conference—we'll let you know through our *Occasional Newsletter* distributed to those who join IR's mailing list at http://integral-review.org/email_issue/index.asp.

In other news, IR has been picked up by EBSCO, the largest supplier of online journals to academic institutions around the world. IR is now listed in its humanities database, and we welcome the additional exposure this provides for a broader range of academic researchers to access works published in IR. We will be applying for listing in EBSCO's social sciences database in 2010, as well as the American Psychological Association's psycINFO database.

We have reviewed our submissions deadline policy in light of a number of factors and have now instituted a rolling submissions schedule. Thus submissions are accepted at any time, and are published in the issue following completion of review and any revisions. This reflects the reality that each submission requires individual treatment in terms of the time and effort it requires to reach publication, and it gives us more flexibility in organizing our editorial processes.

Looking to future issues and following from the themes explored in this issue, we are particularly inviting papers that further explore the themes of assessment of adult development and the application of integrally-informed models for organizational and leadership change and transformation.



In This Issue...

As usual, this issue features articles on a wide range of leading edge interdisciplinary topics covering the theory-to-practice spectrum. Several submissions are in response to Stein & Heikkinen's paper on *Models, Metrics, and Measurement in Developmental Psychology* in the June 2009 issue of Integral Review. I will report on these in the succeeding section.

The section of peer reviewed articles in this issue begins with *The Coherent Heart*, in which Rollin McCraty and colleagues share a detailed report of a wide range of fascinating research studies during the last decade that show how emotion and the physiological state of the heart interacts with numerous physical and psychological systems. They show how coherence in heart rhythm and harmonious synchronization in heart-brain interactions are associated with positive emotions and significantly impact a number of indicators of well-being. They work with the Institute of HeartMath, which has developed contemplative activities for the practice of sustained positive emotion that induce heart rhythms related to health and well-being. The research uses dynamic systems theory and looks at both neurocardiological data and the heart's generation of electromagnetic fields.

In *The Ethics of Promoting and Assigning Adult Developmental Exercises: A Critical Analysis of the Immunity to Change Process*, Sofia Kjellström shares her experiences of using Kegan and Lahey's Immunity to Change Process in higher education. This process is usually used in organizational contexts to help participants uncover unexamined or unconscious assumptions that prevent them from reaching important goals and commitments. It requires participants to reflect in deep and vulnerable ways upon disparities between intention and action. Kjellström discusses a number of limitations and ethical issues that arise in trying to use the method in educational contexts and in so doing introduces her perception of hidden assumptions of the Immunity to Change model itself. She examines the possible mismatch between organizational contexts and classroom contexts in terms of the desire to change and reflect upon oneself, commitment to the change process, trust among those engaged in the process, and the developmental level required to use the process. The results are of interest to all who facilitate the process, and those who value giving students authentic, engaged, and/or transformative experiences in the classroom, but must grapple with the fact that school has critical differences with real life contexts such as work and family.

Our third peer reviewed article is Bill Torbert and Reut Livne-Tarandach's *Reliability and Validity Tests of the Harthill Leadership Development Profile in the Context of Developmental Action Inquiry Theory, Practice and Method*. This is a response to Stein & Heikkinen's paper, and is summarized with the other responses later.

The editorially reviewed section of this issue begins with *Toward Integral Higher Education Study Programs in the European Higher Education Area: A Programmatic and Strategic View*, in which Markus Molz reviews the state of higher education in the EU, looking at trends and imagining possible futures. He sets the historical, pedagogical, and institutional context for attempts at bringing integral approaches to higher education, and argues for the critical importance of such approaches, despite the only moderate and often ungainly attempts to date.

His analysis of why it has been so difficult to create sustained integral programs leads into a series of recommendations for future attempts.

In *Consciousness in Evolution Sketch for a New Model – A Speculation* Donald Padelford takes us on an informal yet in-depth tour of his "Twenty Tenets of an New Model of Evolution." Ken Wilber proposed an earlier, different set of Twenty Tenets in *Sex, Ecology, Spirituality*, but Padelford introduces his own insights and includes references to more recent work in the field. He brings a unique voice to the oft-pondered relationships between mind, matter, hierarchy, development, consciousness, causality, and interiority. His analysis is based in part on the construct of hierarchical negentropic systems.

R. Scott Pochron's *A Leadership Journey: Personal Reflections from the School of Hard Knocks* is a reflection upon the lessons learned in many years of leadership in diverse organizations. His themes include "organization as organism," "leading as enacting an emerging future," "disequilibrium," and "leadership as a state of mind." Along the way, he draws stories and principles from leadership and organization change authors including Quinn, Jaques, and Senge.

Russ Volckmann graces our pages with another engrossing interview. In this issue he speaks with Alfonso Montuori, Chair and Professor of the Transformative Studies Ph.D. and Transformative Leadership Master's program at the California Institute of Integral Studies, and IR Editorial Board member, on the themes of creativity and transdisciplinarity. These themes emerge and resurface as Montuori discusses his stint as a professional saxophone player in England, his involvement with the Monterey Institute of International Studies, his teaching in China, and his work editing the *World Futures Journal*, taking us on an international tour of the places he has lived and worked. It is a paradigmatic yet idiosyncratic ride through the cultural shifts in this age of Aquarius, and a conceptual voyage through theories of everything, general theories of leadership, metatheory, epistemology and complexity, disciplinary promiscuity, and "liquid life." In his interview Volckmann helps reveal that life of "creativity...as a way of being" with each movement echoing "the sound of surprise."

Editorial Board member Roland Benedikter reviews John Holman's book, *The Return of the Perennial Philosophy: The Supreme Vision of Western Esotericism*. While he appreciates its treatment of trends in exploratory first person "empirical spirituality" vs. traditional faith-based spirituality, overall he finds the book to be "an interesting but incomplete contribution," in part due to the author's inability to take enough of an objective and non-promotional distance from his subject.

Responses to Models, Metrics, and Measurement in Developmental Psychology

In our June 2009 issue we published an article by Zak Stein and Katie Heikkinen titled *Models, Metrics, and Measurement in Developmental Psychology*. When we first spoke with Zak about publishing a paper on this topic we were aware that it could serve as a lightning rod for vigorous debate, and saw this as an opportunity to plan for our first article-response-rejoinder format crossing multiple issues of IR. The obfuscated lines between research and the

marketplace, problematic in so many academic fields, show up vividly in developmental psychology, where developmental assessments are being used increasingly to evaluate development of individuals in domains including leadership/management, therapy, and academic programs.

Through various channels, we invited responses from theorists and practitioners, and are pleased to publish in this issue a number of responses, including submissions from Bill Torbert, Michael Commons, Theo Dawson, Michael Basseches, the principals at Ikan, myself, and separate rejoinder articles from Stein and Heikkinen. Stein and Heikkinen's earlier article had also inspired Bill Torbert to host a face to face meeting of developmental practitioners and theorists. Terri O'Fallon reported her reflections on that meeting in the October issue of *Integral Leadership Review*, (linked in the Table of Contents for this section), and we publish a transcript of that meeting's closing conversation, which gives a flavor of the day-long meeting.

Summary of Key Elements of the Original Article

In *Models, Metrics, and Measurement*, Stein and Heikkinen introduce a framework and terminology aimed at supporting more rigor in developmental models and metrics (Figure 1 in the paper). They differentiate "soft metrics" from "calibrated metrics" with the latter having more stringent "reliability and validity profiles." They also propose that every metric we use for developmental assessment or research should have reliability and validity profiles associated with it. "If we want to see an integral and developmental worldview gain a real institutional foothold—radically reforming business, government, education, therapy, and our own sense of human potentials—we need to get serious about our quality control standards" (p. 19).¹

Central to Stein and Heikkinen's 2009 paper is a strong proposition that only *calibrated* metrics are appropriate for assessing individual performance, as only they can make "reliable fine-grained distinctions." They propose that soft metrics are admissible for research studies, whose results are averaged over many subjects, and where the outcomes do not reflect upon any individual. When soft metrics used in research are adapted to evaluate individuals, the margins of error are large (according to the very definition of soft metric). For such metrics, an assessment outcome of, for example, "you are at level 4" is misleading and potentially harmful, when a more accurate report might be "an 85% certainty that you are within levels 3, 4, or 5" (my example, not a quote from the paper).

Stein and Heikkinen go on to do a "limited and exploratory literature review of metrics currently in play," looking for published evidence of validity and reliability quality assessments. The paper's Table 2 summarizes this review, and includes work by Torbert, Cook-Greuter, Jaques, Kegan, Beck & Cowan, Graves, Commons, and Dawson (and their colleagues). The results "reveal a conspicuous lack of psychometric rigor on the part of some of the most popular developmental approaches" (p. 4). The only metrics that rise to the level of calibrated

¹ This article continues to take up issues of praxis ethics, following papers at 2008 Integral Theory Conference and in *Integral Leadership Review*, in which Stein and Heikkinen suggest that there is a persistent fact/value confusion in the field of developmental research and application, in which higher levels of development are assumed, implicitly or without sufficient justification, to be desired and of superior value.

measurement are those used in the work of Dawson and colleagues (which draws on Commons' and Fischer's developmental models). "It appears that the LAS and HCSS are the only metrics that have been calibrated using quantitative indexes of internal consistency" (p. 19). Stein is transparent about the fact that he is Dawson's partner in a commercial venture based upon Dawson's LAS scoring system.

Pointing to the non-exhaustive nature of the literature review (they searched in Google Scholar and PsycINFO using a reasonable set of keywords), the authors say they are "just trying to kick-start a concerted discourse about quality control in the field" and they invited colleagues to "work together to fill out and expand the [publications list], making clear to each other and to all those affected exactly what we are doing" (p. 19).

The Invitation

At *Integral Review*, we are interested in fostering theory/praxis integration and see acts of publication themselves as opportunities to investigate integral principles. Stein and Heikkinen's prescriptions are far reaching and their analysis is provocative. They call upon individual scholars and the field as a whole to take a hard look at the ethical implications of their work. As the lines between academic research and commerce increasingly blur in all scholarly fields, such questions become both more critical and more harrowing to address with authenticity and openness. In our invitation for responses we said we were interested in submissions that

integrate first-, second-, and third-person perspectives, and illustrate an author's embodiment of higher (second tier, integral, metasystematic, etc.) levels of ethical and psycho-socio-systemic reflection. We believe that a community of "integral" scholars (however we might define it) has the potential to engage in dialogs that embrace authenticity/vulnerability/empathy *and* rigor at levels rarely seen in academic discourse.

In other words, to what extent can the scholarly author or the business practitioner (so often one and the same these days) openly reflect upon and be transparent about deeper motives, possible biases and blind spots, emotional overtones, and uncertainties? Can we as colleagues (and often as friends) in dialog pose insightful yet caring questions that support integrity and transparency without falling into patterns of critique that feed more destructive than constructive to the recipient? This challenge is romantic and naïve if not tempered by an acknowledgement of the acute difficulties and complexities it raises. But we have hopes that articles in the integral community might illustrate some small but significant movement at this leading edge. The in-person dialogs at Torbert's meeting certainly seemed to illustrate this potential. We will leave it to the reader to judge how well the respondents did so.

Responses to the Article

We were pleased to accept a number of responses, introduced below. Our first response came in an informal letter from Bill Torbert which was published in IR's Occasional Newsletter #7, July 2009, along with a reply from Stein (see link in the Table of Contents). We also want to note Terri O'Fallon's piece in *Integral Leadership Review* (also linked in the Table of Contents)

which is a description of the October 3rd meeting at Bill Torbert's house, which arose as a response to Stein and Heikkinen's article.

We begin this section of responses with a transcript of the *Closing Conversation of the "Validity Day" Meeting at Bill Torbert's, October 3, 2009*. This transcript portrays a rich cast of characters deeply engaged in an intense and generative conversation that was the culmination of this meeting. It addresses the challenges ahead as the field of developmental psychology enters into a time when such psychometrics are becoming more in demand and when practitioners may not have the depth of rigorous knowledge felt necessary to use such tools appropriately. Thus an intention emerged for a knowledgeable group to form a community of inquiry to better lay some critical foundations for how this future unfolds.

Bill Torbert and Reut Livne-Tarandach sent an in-depth (19 page) reply (noted above in our peer review section) in *Reliability and Validity Tests of the Harthill Leadership Development Profile in the Context of Developmental Action Inquiry Theory, Practice and Method*. Torbert and Livne-Tarandach "challenge [Stein & Heikkinen's] critique of the LDP as a soft measure unsupported by published, quantitative psychometric reliability and validity studies ... and present both previously unpublished and previously published-but-not-aggregated studies illustrating Harthill LDP as a well-calibrated measure of adult ego-development." They also "consider what a social science and a social practice based on the developmentally late action-logics will look like [once it embraces] 1st-, 2nd-, and 3rd-person research and action with co-participants in live settings."

Theo Dawson sent two brief responses (3 pages) that we combined into *Working Within the Limits: Thoughts on Stein and Heikkinen*. She reflects upon the nature of assessment validity and reliability and upon the constraints upon real-life use of such instruments. She included an appendix titled *Reliability – Some Basics* to help our readers understand some of the subtleties of the topic. She comments on the practical use, or lack thereof, that developmental measurements may have for end users, noting that "the more we hone in on a measureable dimension—the greater our precision becomes—the narrower the construct becomes." She continues by saying that "Formal measures, no matter how many great ones we design, should always be employed by knowledgeable mentors, clinicians, teachers, or coaches as a single item of information about learners that may or may not provide useful insights into their needs."

In *A Personal Counterpoint to Stein and Heikkinen* (3 pages) Michael Basseches suggests that in addition to questions of validity and reliability, it is equally important to question the use to which developmental assessments are put. He takes Dawson's concerns further and cautions against the potential of a "tyranny of measures that replaces respectful discourse and collective adaptation as the social context." He uses the developmental capacity of dialectical thinking from his own research to illustrate. Only when one has "encountered the limits of [their] lower level structure [i.e., formal operational thought], and begun to glimpse the power of the novel alternative to transcend those limits [i.e., dialectical intelligence]" is one in a position to appreciate the implications of an assessment of dialectical intelligence (or any higher stage capacity).

In *Further Issues in Stage Metrics* (5 page response, plus 5 pages of References and Appendices) Michael Lamport Commons takes the opportunity to clarify the nature and history of the Model of Hierarchical Complexity—the construct and the surrounding theory. Zak's own work with the LAS (with Dawson) draws strongly from Commons' work, so this response provides a deepening background context for Stein and Heikkinen's paper. Commons also differentiates his work from Fischer's Skill Theory, which also contributed substantially the LAS.

From the commercial side of the street comes a response from the principals at InterKannections (ikan.biz). *A Practitioners' Perspective on Developmental Models, Metrics and Community* (19 pages) by Chad Stewart, Zach Smith and Norio Suzuki, gives a peek at a range of assessment instruments being used by a particular consulting company. The authors describe integrally-informed instruments that they have developed or adapted for assessing a range of constructs important to businesses, including 360 performance evaluations, leadership profiling tools, and an organizational sustainability scorecard. They conclude that purely linguistic evaluation instruments must be supplemented by performance-based assessments and metrics that evaluate outcomes (lagging indicators) as well as internal capacities (leading indicators).

Through the ensuing debate I was moved to pen a response titled *Intuiting the Cognitive Line in Developmental Assessment: Do Heart and Ego Develop According to Hierarchical Integration?* in which I explore some of the underlying issues in a question that came in these debates regarding developmental assessments: are they too tied to "the cognitive line" (or language skills)? In this informal analysis I inquire into whether the development of capacities related to heart, ego, and spirit can be captured using current models based on hierarchical integration and coordination.

In his rejoinder *Educational Crises and the Scramble for Usable Knowledge*, Zak Stein carries forward his appeal for more serious discussion among the designers and users of developmental models and tools, this being a third installment in what he intends as a series of papers on the theme. He argues that the profound challenges facing global society today "have critical educational dimensions" yet the "pressing global demand for innovative educational solutions... has the potential to systematically distort the production of relevant usable knowledge" about human learning and development. He iterates his previously-expressed support for Sara Ross's 2008 call for an "Institute for Applied Developmental Theory" focusing on quality control and fostering collaboration." He goes on to identify issues within the community of developmentalists that he sees as inhibiting the quality of dialog necessary to make sufficient progress.

In her rejoinder *It's an Empirical Question: On Cognition and Ego*, Katie Heikkinen jumps bravely into rarely explored territory in warning against the phenomena of disqualifying the arguments of a colleague because of perceived developmental inadequacies (coming from a lower developmental position). She follows Stein's rejoinder comments section on *Lack of Epistemic Humility*. This "labeling colleagues" territory is rich, sensitive, and nuanced. In part due to some of Wilber's arguments and others mentioning "adequatio," it has become common doctrine in the integral community that one can't "see" stuff at higher levels than they are at, at least along a particular developmental line. And differences in expertise in any domain can be (is

not always) hierarchical in nature. But putting this intuition to use with real people in real contexts, and fleshing out which elements of it are true, useful, and/or ethical, is problematic. In addition to raising questions of how we could, or whether we would ever want to, "objectively" assess scholarly adequacy in a domain, it raises the question of whether we can profess and value humility, yet be able to compassionately and squarely look at deeply ingrained forms of "arrogance" that are tacitly cultivated in academic work. In a sense we know "labeling colleagues" is wrong, and Heikkinen and Stein help articulate why, but when we catch ourselves engaged in this type of thought, individually (I certainly have) or systemically, what options are available to us in open dialog and self/system analysis?

Heikkinen's discussion on this theme is limited to a particular issue, but she and Stein open a Pandora's box that may hold extensive treasures should the community take up this delicate issue in more depth and breadth. The issue points to a possible shadow element of the integral community of theory and practice. As was said in IR's invitation for responses "such questions become both more critical and more harrowing to address with authenticity and openness," yet we believe that a community of "integral" scholars (however we might define it) has the potential to engage in dialogs that embrace authenticity/vulnerability/empathy and rigor at levels rarely seen in academic discourse." Any takers? Write to us!

Anyways, back to Heikkinen's rejoinder. Following her discussion on "labeling colleagues" she asks some frank questions about whether any of the respondents addressed the core questions about calibrated metrics. She goes on to explore questions raised in my own article on whether wisdom skills can be evaluated using hierarchical complexity. Finally, she describes her current research project involving recoding Kegan's Subject-Object Interview data using the Hierarchical Complexity and the LAS.

Concluding Thoughts

In the end we see that Stein and Heikkinen's June 2009 paper served well to motivate a wide range of responses on the general theme the appropriate use of developmental assessments, and to further the dialog on this important topic. Their call for assistance in filling in their table of published findings on the validity of developmental instruments was answered only by Torbert. Issues surrounding the practical usefulness and valid application of developmental tests were widely addressed, but Stein and Heikkinen's core concern about whether we are doing more harm than good in offering clients measurement results that are not transparent about their degree of uncertainty was not picked up by many.

Test validity and reliability are very time-consuming to establish, and require access to controlled situations and large numbers of data points. They also require instruments that remain fixed (that the measurement tool is constant), which prohibits the type of ongoing-improvement that characterize most practical methodologies. Many instruments capture a particular model for categorizing human capacities (such as the Myers-Briggs assessment) that have proven to be "tried and true" useful in the field for "adding value" to clients and customers, but have not been proven to have the psychometric properties the Stein and Heikkinen claim are necessary for accurate (thus ethical) use. Is using such instruments like the story of the man who lost his keys

in the bushes but was looking for them under the street lamp because "the light was better there"?

But it is not that clear cut. One thing that several of the authors working in commercial contexts allude to indirectly is the potential for these instruments to serve as meaning-generating and self-reflection tools. Given a categorizing scheme, whether it be Action-logics, Enneagram types, or Astrological types, one can assess individuals (or groups) and present the scheme as a conversational tool for framing weaknesses, strengths, goals, opportunities, and intentions. If the uncertainty of any measurement is clarified, perhaps supplemented by self-evaluation ("what category do you think you are in?"), then instruments that lack strong validity or reliability can nonetheless be quite useful. On the other hand, repeated client feedback that the consultation seemed insightful and quite useful can mislead the practitioner into thinking that the tool is valid and reliable, and no substitute for rigorous psychometric evaluation.

The responses suggest that we may benefit from differentiating two contexts. In cases where assessments are used by third parties to make judgments that will have an effect on the lives of individuals, great care must be taken to avoid a "tyranny of measures." On the other hand, when the instruments are used by individuals or groups in dialogic, self-reflective first-, second-, third-person meaning-generation processes, the validity and reliability standards can be relaxed and still prove ethical and useful.

Responses to Stein and Heikkinen's original paper, including Stein and Heikkinen's Rejoinders, may have raised more questions than they answered, and to me it feels as though on many topics we are still in mid or early dialog, as a community of inquiry. We invite further thoughts, responses, and articles from our readers, which we may publish in our next newsletter, or our next Issue.

I hope you enjoy this issue!

Tom Murray
Associate Editor
December 12, 2009

The Coherent Heart

Heart–Brain Interactions, Psychophysiological Coherence, and the Emergence of System-Wide Order

Rollin McCraty, Ph.D., Mike Atkinson, Dana Tomasino, B.A.,
and Raymond Trevor Bradley, Ph.D.¹

Abstract: This article presents theory and research on the scientific study of emotion that emphasizes the importance of coherence as an optimal psychophysiological state. A dynamic systems view of the interrelations between psychological, cognitive and emotional systems and neural communication networks in the human organism provides a foundation for the view presented. These communication networks are examined from an information processing perspective and reveal a fundamental order in heart-brain interactions and a harmonious synchronization of physiological systems associated with positive emotions. The concept of coherence is drawn on to understand optimal functioning which is naturally reflected in the heart's rhythmic patterns. Research is presented identifying various psychophysiological states linked to these patterns, with neurocardiological coherence emerging as having significant impacts on well being. These include psychophysiological as well as improved cognitive performance. From this, the central role of the heart is explored in terms of biochemical, biophysical and energetic interactions. Appendices provide further details and research on; psychophysiological functioning, reference previous research in this area, details on research linking coherence with optimal cognitive performance, heart brain synchronization and the energetic signature of the various psychophysiological modes.

Keywords: Cognitive performance, coherence, emotion, heart rate variability, heart-brain interactions, neurocardiology, psychophysiological coherence, quantum holographic principles.

¹This volume draws on the basic research conducted over the last decade at the Institute of HeartMath by Dr. Rollin McCraty and Mike Atkinson. The original manuscript for this article was drafted between 1998 and 2003 by Rollin McCraty and Dana Tomasino. Mike Atkinson conducted the analysis of the research reported here and also constructed the figures and graphs displaying the statistical information. Dr. Raymond Bradley joined the project in 2004 to work on a major revision and expansion of the manuscript to help bring the article to its present form.

Correspondence should be directed to Dr. Rollin McCraty, Director of Research, HeartMath Research Center.

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...there are organism states in which the regulation of life processes becomes efficient, or even optimal, free-flowing and easy. This is a well established physiological fact. It is not a hypothesis. The feelings that usually accompany such physiologically conducive states are deemed "positive," characterized not just by absence of pain but by varieties of pleasure. There also are organism states in which life processes struggle for balance and can even be chaotically out of control. The feelings that usually accompany such states are deemed "negative," characterized not just by absence of pleasure but by varieties of pain. ... The fact that we, sentient and sophisticated creatures, call certain feelings positive and other feelings negative is directly related to the fluidity or strain of the life process.

(Damasio, 2003, p. 131)

Prologue²

Chris, a 45-year-old business executive, had a family history of heart disease, and was feeling extremely stressed, fatigued, and generally in poor emotional health. A 24-hour heart rate variability analysis³ revealed abnormally depressed activity in both branches of his autonomic nervous system, suggesting autonomic exhaustion ensuing from maladaptation to high stress levels. His heart rate variability was far lower than would be expected for his age, and was below the clinical cut-off level for significantly increased risk of sudden cardiac death. In addition, Chris's average heart rate was abnormally high at 102 beats per minute, and his heart rate did not drop at night as it should.

Upon reviewing these results, his physician concluded that it was imperative that Chris take measures to reduce his stress. He recommended that Chris begin practicing a system of emotional restructuring techniques that had been developed by the Institute of HeartMath. These positive emotion-focused techniques help individuals learn to self-generate and sustain a beneficial functional mode known as psychophysiological coherence, characterized by increased emotional stability and by increased synchronization and harmony in the functioning of physiological systems.

Concerned about his deteriorating health, Chris complied with his physician's recommendation. Each morning during his daily train commute to work, he practiced the Heart Lock-In technique, and he would use the Freeze-Frame technique in situations when he felt his stress levels rise.⁴

² Excerpted from McCraty & Tomasino (2006), pp. 360-361.

³ The analysis of heart rate variability (HRV), a measure of the naturally occurring beat-to-beat changes in heart rate, provides an indicator of neurocardiac fitness and autonomic nervous system function. Abnormally low 24-hour HRV is predictive of increased risk of heart disease and premature mortality. HRV is also highly reflective of stress and emotions.

⁴ The Heart Lock-In tool is an emotional restructuring technique, generally practiced for 5 to 15 minutes, that helps build the capacity to sustain the psychophysiological coherence mode for extended periods of time. The Freeze-Frame technique is a one-minute positive emotion refocusing exercise used in the moment that stress is experienced to change perception and modify the psychophysiological stress response. For in-depth descriptions of these techniques, see Childre & Martin (1999) and Childre & Rozman (2005).

At first Chris was not aware of the transformation that was occurring. His wife was the first to notice the change and to remark about how differently he was behaving and how much better he looked. Then his co-workers, staff, and other friends began to comment on how much less stressed he appeared in responding to situations at work and how much more poise and emotional balance he had. A second autonomic nervous system assessment, performed six weeks after the initial one, showed that Chris's average heart rate had decreased to 85 beats per minute and it now lowered at night, as it should. Significant increases were also apparent in his heart rate variability, which had more than doubled! These results surprised Chris' physician, as 24-hour heart rate variability is typically very stable from week to week, and it is generally quite difficult to recover from autonomic nervous system depletion, usually requiring much longer than six weeks.

In reflecting on his experience, Chris started to see how profoundly his health and his life had been transformed. He was getting along with his family, colleagues, and staff better than he could remember ever having enjoyed before, and he felt much more clearheaded and in command of his life. His life seemed more harmonious, and the difficulties that came up at work and in his personal relationships no longer created the same level of distress; he now found himself able approach them more smoothly and proactively, and often with a broadened perspective.

The true story of Chris's transformation is not an isolated example, but rather is only one of many similar case histories that people like Chris have shared with HeartMath, illustrating the amazing transformations that can occur when one learns how to increase psychophysiological coherence.

Introduction

Many contemporary scientists believe that the quality of feeling and emotion we experience in each moment is rooted in the underlying state of our physiological processes. This view is well expressed by neuroscientist Antonio Damasio in the epigram that opened this article. The essence of his idea is that we call certain emotional feelings "positive" and others "negative" because these experiences directly reflect the impact of the "fluidity or strain of the life process" on the body, as is clearly evident in Chris' case, above. The feelings we experience as "negative" are indicative of body states in which "life processes struggle for balance and can even be chaotically out of control" (Damasio, 2003, p. 131). By contrast, the feelings we experience as "positive" actually reflect body states in which "the regulation of life processes becomes efficient, or even optimal, free-flowing and easy" (Damasio, p. 131).

While there is a growing appreciation of this general understanding in the scientific study of emotion, here we seek to deepen this understanding in three primary ways. First, our approach is based on the premise that the physiological, cognitive, and emotional systems are intimately interrelated through ongoing reciprocal communication. To obtain a deeper understanding of the operation of any of these systems, we believe it is necessary to view their activity as emergent from the dynamic, communicative network of interacting functions that comprise the human organism. Second, we adopt an information processing perspective, which views communication within and among the body's systems as occurring through the generation and transmission of

rhythms and patterns of psychophysiological activity. This points to a fundamental order of information communication—one that both signifies different emotional states, operates to integrate and coordinate the body's functioning as a whole, and also connects the body to the external world. And third, we draw on the concept of *coherence* from the physics of signal processing to understand how different patterns of psychophysiological activity influence bodily function. Efficient or optimal function is known to result from a harmonious organization of the interaction among the elements of a system. Thus, a harmonious order in the rhythm or pattern of psychophysiological activity signifies a coherent system, whose efficient or optimal function is directly related, in Damasio's terms, to the ease and "fluidity" of life processes. By contrast, an erratic, discordant pattern of activity denotes an incoherent system, whose function reflects the difficulty and "strain" of life processes.

In this article we explore the concept and meaning of coherence in various psychophysiological contexts and describe how coherence within and among the physiological, cognitive, and emotional systems is critical in the creation and maintenance of health, emotional stability, and optimal performance. It is our thesis that what we call emotional coherence—a harmonious state of sustained, self-modulated positive emotion—is a primary driver of the beneficial changes in physiological function that produce improved performance and overall well-being. We also propose that the heart, as the most powerful generator of rhythmic information patterns in the body, acts effectively as the global conductor in the body's symphony to bind and synchronize the entire system. The consistent and pervasive influence of the heart's rhythmic patterns on the brain and body not only affects our physical health, but also significantly influences perceptual processing, emotional experience, and intentional behavior.

There is abundant evidence that emotions alter the activity of the body's physiological systems. Yet the vast majority of this scientific evidence concerns the effects of negative emotions. More recently, researchers have begun to investigate the functions and effects of positive emotions. This research has shown that, beyond their pleasant subjective feeling, positive emotions and attitudes have a number of objective, interrelated benefits for physiological, psychological, and social functioning (Fredrickson, 2002; Isen, 1999).

In contributing to this work, we discuss how sustained positive emotions facilitate an emergent global shift in psychophysiological functioning, which is marked by a distinct change in the rhythm of heart activity. This global shift generates a state of optimal function, characterized by increased synchronization, harmony, and efficiency in the interactions within and among the physiological, cognitive, and emotional systems. We call this state *psychophysiological coherence*. We describe how the coherence state can be objectively measured and explore the nature and implications of its physiological and psychological correlates. It is proposed that the global synchronization and harmony generated in the coherence state may explain many of the reported psychological and physiological health benefits associated with positive emotions.

Our discussion of the major pathways by which the heart communicates with the brain and body shows how signals generated by the heart continually inform emotional experience and influence cognitive function. This account includes a review of previous research on heart-brain interactions and theories regarding how the activity of the heart affects brain function and

cognitive performance. We then present research conducted in our laboratory, which brings a new perspective, focusing on the *pattern* of the rhythm of heart activity and its relationship to emotional experience. From this vantage point, we derive a new hypothesis—that sustained, self-induced positive emotions generate a shift to a state of system-wide coherence in bodily processes, in which the coherent pattern of the heart’s rhythm plays a key role in facilitating higher cognitive functions.

In short, the science reviewed in this article shows that through regular heart-based practice, it is possible to use positive emotions to shift one’s whole psychophysiological system into a state of global coherence. When sustained, the harmonious order of coherence generates vital benefits on all levels and can even transform an individual’s life, as we saw in the prologue describing Chris’s story.

Theoretical Considerations

We begin by introducing the basic concepts and theoretical ideas that inform the material presented in this article.

Conceptual Framework

Integral to the understanding of psychophysiological interaction developed in this work are the concepts of information and communication. As we will see next, coherence is a particular quality that emerges from the relations among the parts of a system or from the relations among multiple systems. And since relations are constitutive of systems, the communication of information plays a fundamental constructive role in the generation and emergence of coherence. Although the communication of information is largely implicit in the interactional basis of the three basic concepts of coherence we begin with in this conceptual framework, we go onto develop a detailed account of the nature, substance, and dynamics of the psychophysiological interactions between the heart, the brain, and the body as a whole.

Information and Communication

The most basic definition of *information* is data which *in-form*, or give shape to, action or behavior, such as a message that conveys “meaning” to the recipient of a signal (Bradley & Pribram, 1998). In human language, abstract symbols like words, numbers, graphical figures, and even gestures and vocal intonations are used to encode the meaning conveyed in a message. In physiological systems, changes in chemical concentrations, the amount of biological activity, or the pattern of rhythmic activity are common means by which information is encoded in the movement of energy to inform system behavior.

But in order to be used to shape or regulate system behavior, the information must be distributed to and “understood” by the system elements involved. Thus, by *communication* we mean a process by which meaning is encoded as a message and transmitted in a signal to be received, processed, and comprehended by the various elements of a system.

The Concept of Coherence

In this article we describe the relationship between different patterns of psychophysiological activity and physiological, emotional and cognitive functions by drawing on three distinct but related concepts of coherence used in physics; *global coherence*, *cross coherence* and *auto-coherence*. The most common definition of coherence is "the quality of being logically integrated, consistent and intelligible," as in a coherent argument. A related meaning is "a logical, orderly and aesthetically consistent relationship of parts" (McCraty & Tomasino, 2006, p. 4). In the following discussion we delve deeper into the meaning of coherence.

Coherence in ordinary language means correlation, a sticking together, or connectedness; also, a consistency in the system. So we refer to people's speech or thought as coherent, if the parts fit together well, and incoherent if they are uttering meaningless nonsense, or presenting ideas that don't make sense as a whole (Ho, 1998). Thus, coherence in this context refers to wholeness and a global order: This is coherence as a distinctive organization of parts, the relations among which generate an emergent whole that is greater than the sum of the individual parts. In the example of organizing words in a coherent sentence, the meaning and purpose conveyed by the arrangement of the words is greater than the individual meaning of each word.

It is important to note that all systems, to produce any function or action, must have the property of *global coherence*. The efficiency and effectiveness of the function or action can vary widely, however, and therefore does not necessarily result in a coherent flow of behavior. Global coherence does not mean that everybody or all the parts are doing the same thing at the same time. Think of a jazz band for example, where the individual players are each doing his or her own thing, yet keeping in tune and step with the whole band. Coherence in this sense maximizes local freedom and global cohesion and resonance with the musical theme (Ho, 1998).

In a living system global order or coherence must be sustained and maintained over time. For example, biochemist and geneticist Mae-Wan Ho (1998) has suggested that a whole living system is a domain of coherent, autonomous activity that is coordinated across a continuum from the molecular to macroscopic to social levels.

In physics, the concept of coherence is also used to describe the interaction or coupling among different oscillating systems in which synchronization is the key idea in this concept. Synchronization describes the degree to which two or more waves are either phase or frequency-locked together, or when communication occurs between systems or modes without obstruction.

Returning to the music example, a chord is composed of notes of different frequencies yet resonate as a harmonious order of sound waves. In physiology, coherence is similarly used to describe the degree of coupling and harmonious interaction between two or more of the body's oscillatory systems such as respiration and heart rhythms. There are modes where they are operating at different frequencies, and modes when they become entrained and oscillate at the same frequency. This is also true for brain states in which the brainwaves can be momentarily in phase at different locations across the brain. The term *cross-coherence* is used to specify this type aspect of coherence.

Another example, from a physiological systems perspective, is that people's thoughts, emotions and attitudes can either be aligned and coherent or incoherent. When individuals think one way, feel another, and behave inconsistently, they are in an inefficient and ineffective state—that's non-coherence. A situation adults commonly face illustrates another kind of incoherence. For example, if a child has hit another child and must be taught to be kind to others and that hitting is not acceptable, consider the internal state of an adult in the following two scenarios:

1. The adult who punishes the child with a spanking for hitting another child.
2. The adult who takes time to teach and encourage the child to apologize and render an act of service or kindness to the other child. In this instance, the thoughts, feelings and actions of the adult are in coherent alignment with the message being taught. Then the child is more likely to have a coherent understanding of the lesson being taught.

Another aspect of coherence relates to the dynamics of the flow of action produced by a single system (McCraty & Tomasino, 2006). This is *coherence as a uniform pattern of cyclical behavior*. Because this pattern of action is generated by a single system, the term *auto-coherence* is used to denote this type of coherence. This concept is commonly used in physics to describe the generation of an ordered distribution of energy in a waveform. An example is a sine wave, which is a perfectly coherent wave. The more stable the frequency, amplitude, and shape of the waveform, the higher the degree of coherence. In physiological systems, this type of coherence describes the degree of order and stability in the rhythmic activity generated by a single oscillatory such as the heart's rhythmic activity. When coherence is increased in a single system that is coupled to other systems, it can pull the other systems into coherence or *entrainment*, resulting in increased cross-coherence in the activity of the other systems, even across different time scales of activity. An example of this is in the increased heart-brain synchronization that occurs in a heart coherent mode.

Theory

The material presented in this article is informed by the following theoretical considerations. Our psychophysiological systems process an enormous amount of information, which must be continuously communicated from one part of the brain or body to another and often stored as a memory of one type or another. The traditional approach to understanding how the body's systems interact adopts an activation perspective, in which variation in the *amount* of a substance or the *amount* of a given physiological activity is viewed as the basis of communication. Although the amount of activity is clearly an important aspect of communication, the generation and transmission of *rhythms and patterns* of physiological activity appear reflective of a more fundamental order of information communication—one that signifies different emotional states and operates to integrate and coordinate the body's functioning as a whole.

Throughout the body, information is encoded in waveforms of energy as patterns of physiological activity. Neural, chemical, electromagnetic, and oscillatory pressure wave patterns are among those used to encode and communicate biologically relevant information. By these means, the body's organs continually transmit information to the brain as patterns of afferent (ascending) input. In turn, as we will see below, changes in the patterns of afferent input to the

brain cause significant changes in physiological function, perception, cognition, emotion, and intentional behavior.

A primary proposition explored in this article is that different emotions are associated with distinct patterns of physiological activity. This is the result of a two-way process by which, in one direction, emotions trigger changes in the autonomic nervous system and hormonal system, and in the other direction, specific changes in the physiological substratum are involved in the generation of emotional experience. Research at the Institute of HeartMath has identified six distinct patterns of physiological activity generated during different emotional states. We call these *psychophysiological modes*. Each of these is described in detail in Appendix A. Of particular significance is the *psychophysiological coherence* mode, which is characterized by ordered, harmonious patterns of physiological activity. This mode has been found to be generated during the experience of sustained positive emotions. The psychophysiological coherence mode has numerous physiological and psychological benefits, which can profoundly impact health, performance, and quality of life.

A second proposition is that the heart plays a central role in the generation and transmission of system-wide information essential to the body's function as a coherent whole. There are multiple lines of evidence to support this proposition: The heart is the most consistent and dynamic generator of rhythmic information patterns in the body; its intrinsic nervous system is a sophisticated information encoding and processing center that operates independently of the brain; the heart functions in multiple body systems and is thus uniquely positioned to integrate and communicate information across systems and throughout the body; and, of all the bodily organs, the heart possesses by far the most extensive communication network with the brain. As described subsequently, afferent input from the heart not only affects the homeostatic regulatory centers in the brain, but also influences the activity of higher brain centers involved in perceptual, cognitive, and emotional processing, thus in turn affecting many and diverse aspects of our experience and behavior. These are the central ideas that guide what follows.

The Psychophysiological Network: A Systems Perspective

As science has increasingly adopted a systems perspective in investigation and analysis, the understanding has emerged that our mental and emotional functions stem from the activity of *systems*—organized pathways interconnecting different organs and areas of the brain and body—just as do any of our physiological functions. Moreover, our mental and emotional systems cannot be considered in isolation from our physiology. Instead, they must be viewed as an integral part of the dynamic, communicative network of interacting functions that comprise the human organism.

These understandings have led to the emergence and growth of new scientific fields of study, such as psychophysiology. Psychophysiology is concerned with the interrelations among the physiological, cognitive, and emotional systems and human behavior. It is now evident that every thought, attitude, and emotion has a physiological consequence, and that patterns of physiological activity continually influence our emotional experience, thought processes, and behavior. As we will see shortly, the efficacy of this perspective has been substantiated by our

own research, as well as that of many others, examining how patterns of psychophysiological activity change during stress and different emotional states.

Heart Rate Variability and Measurement of Psychophysiological Modes

In the early stages of our work at the Institute of HeartMath, we sought to determine which physiological variables were most sensitive to and correlated with changes in emotional states. In analyzing many different physiological measures (such as heart rate, electroencephalographic and electromyographic activity, respiration, skin conductance, etc.), we discovered that the *rhythmic pattern of heart activity* was directly associated with the subjective activation of distinct emotional states, and that the heart rhythm pattern also reflected changes in emotional states, in that it covaried with emotions in real time. We found strong differences between quite distinct rhythmic beating patterns that were readily apparent in the heart rhythm trace and that directly matched the subjective experience of different emotions. In short, we found that the pattern of the heart's activity was a valid physiological indicator of emotional experience and that this indicator was reliable when repeated at different times and in different populations.

In more specific terms, we examined the natural fluctuations in heart rate, known as *heart rate variability* (HRV). HRV is a product of the dynamic interplay of many of the body's systems. Short-term (beat-to-beat) changes in heart rate are largely generated and amplified by the interaction between the heart and brain. This interaction is mediated by the flow of neural signals through the efferent and afferent pathways of the sympathetic and parasympathetic branches of the autonomic nervous system (ANS). HRV is thus considered a measure of neurocardiac function that reflects heart-brain interactions and ANS dynamics.

From an activation theory perspective, the focus is on changes in heart *rate* or in the *amount* of variability that are expected to be associated with different emotional states. However, while these factors can and often do covary with emotions, we have found that it is the *pattern* of the heart's rhythm that is primarily reflective of the emotional state. Furthermore, we have found that changes in the heart rhythm pattern are independent of heart *rate*: one can have a coherent or incoherent pattern at high or low heart rates. Thus, it is the rhythm, rather than the rate, that is most directly related to emotional dynamics and physiological synchronization.

Emotions and Heart Rhythm Patterns

As mentioned at the outset, researchers have spent much time and effort investigating how emotions change the state and functioning of the body's systems. While the vast majority of this body of work has focused on understanding the pathological effects of negative emotions, recent research has begun to balance this picture by investigating the functions and effects of positive emotions.

A synthesis of the voluminous work in developmental neurobiology has shown that the modulation of positive emotions plays a critical role in infant growth and neurological development, which has enormous consequences for later life (Schore, 1994). Other research on adults has documented a wide array of effects of positive emotions on cognitive processing, behavior, and health and well-being. Positive emotions have been found to broaden the scope of

perception, cognition, and behavior (Fredrickson, 2001, 2005; Isen, 1999), thus enhancing faculties such as creativity (Isen, 1998) and intuition (Bolte, Goschke, & Kuhl, 2003). Moreover, the experience of frequent positive emotions has been shown to predict resilience and psychological growth, (Fredrickson, Tugade, Waugh, & Larkin, 2003) while an impressive body of research has documented clear links between positive emotions, health status, and longevity (Blakeslee & Grossarth-Maticek, 1996; Danner, Snowdon, & Friesen, 2001; Medalie & Goldbourt, 1976; Moskowitz, 2003; Ostir, Markides, Black, & Goodwin, 2000; Ostir, Markides, Peek, & Goodwin, 2001; Russek & Schwartz, 1997; Seeman & Syme, 1987). In addition, there is abundant evidence that positive emotions affect the activity of the body's physiological systems in profound ways. For instance, studies have shown that positive emotional states speed the recovery of the cardiovascular system from the after-effects of negative emotions (Fredrickson et al., 2000), alter frontal brain asymmetry (Davidson et al., 2003), and increase immunity (Davidson et al.; McCraty, Atkinson, Rein, & Watkins, 1996; Rein, Atkinson, & McCraty, 1995). Finally, the use of practical techniques that teach people how to self-induce and sustain positive emotions and attitudes for longer periods has been shown to produce positive health outcomes. These include reduced blood pressure in both hypertensive and normal populations, (McCraty, Atkinson, Lipsenthal, et al., 2003; McCraty, Atkinson, & Tomasino, 2003) improved functional capacity in patients with heart failure (Luskin, Reitz, Newell, Quinn, & Haskell, 2002), improved hormonal balance, (McCraty, Barrios-Choplin, Rozman, Atkinson, & Watkins, 1998) and lower lipid levels (McCraty, Atkinson, Lipsenthal, et al., 2003).

In investigating the physiological foundation of this important work, we have utilized HRV analysis to show how distinct heart rhythm patterns characterize different emotional states. In more specific terms, we found that underlying the experience of different emotional states there is a distinct physiology directly involved. Thus we have found that sustained positive emotions such as appreciation, care, compassion, and love generate a smooth, sine-wave-like pattern in the heart's rhythms. This reflects increased order in higher-level control systems in the brain, increased synchronization between the two branches of the ANS, and a general shift in autonomic balance towards increased parasympathetic activity. As is visually evident (Figure 1) and also demonstrable by quantitative methods, heart rhythms associated with positive emotions, such as appreciation, are clearly more *coherent*—organized as a stable pattern of repeating sine waves—than those generated during a negative emotional experience such as frustration. We observed that this association between positive emotional experience and this distinctive physiological pattern was evident in studies conducted in both laboratory and natural settings, and for both spontaneous emotions and intentionally generated feelings (McCraty, Atkinson, Tiller, Rein, & Watkins, 1995; Tiller, McCraty, & Atkinson, 1996).

By contrast, our research has shown that negative emotions such as frustration, anger, anxiety, and worry lead to heart rhythm patterns that appear *incoherent*—highly variable and erratic. Overall, this means that there is less synchronization in the reciprocal action of the parasympathetic and sympathetic branches of the ANS (McCraty et al., 1995; Tiller et al., 1996). This desynchronization in the ANS, if sustained, taxes the nervous system and bodily organs, impeding the efficient synchronization and flow of information throughout the psychophysiological systems. Furthermore, as studies have also shown that prefrontal cortex activity is reflected in HRV via modulation of the parasympathetic branch of the ANS (Lane,

Reiman, Ahern, & Thayer, 2001), this increased disorder in heart rhythm patterns is also likely indicative of disorder in higher brain systems.

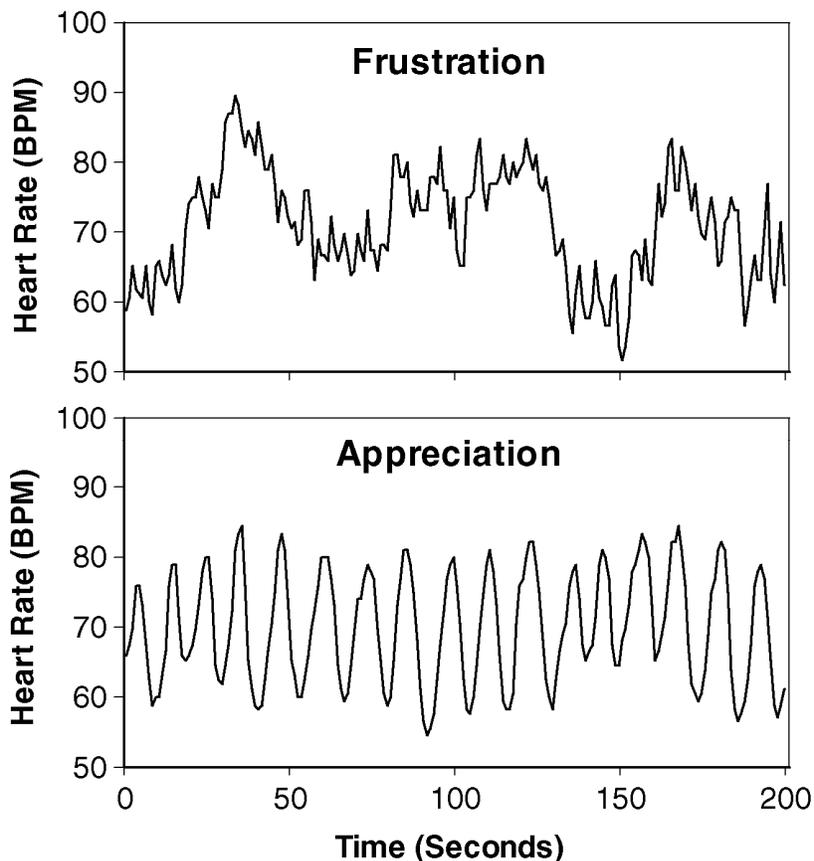


Figure 1. Emotions are reflected in heart rhythm patterns. The heart rhythm pattern shown in the top graph, characterized by its erratic irregular pattern (incoherence), is typical of negative emotions such as anger or frustration. The bottom graph shows an example of the coherent heart rhythm pattern that is typically observed when an individual is experiencing sustained, modulated positive emotions, in this case appreciation.

Psychophysiological Coherence

In our research on the physiological correlates of positive emotions we have found that when certain positive emotional states, such as appreciation, compassion, or love, are intentionally maintained, coherent heart rhythm patterns can be sustained for longer periods, which also leads to increased synchronization and entrainment between multiple bodily systems. Because it is characterized by distinctive psychological and behavioral correlates as well as by specific patterns of physiological activity throughout the body, we introduced the term *psychophysiological coherence*⁵ to describe this mode of functioning.

⁵In earlier publications (Tiller et al., 1996), the psychophysiological coherence mode was referred to as the “entrainment mode” because a number of physiological systems entrain with the heart rhythm in this mode.

Heart Rhythm Coherence

The development of *heart rhythm coherence*—a stable, sine-wave-like pattern in the heart rate variability waveform—is the key marker of the psychophysiological coherence mode. Heart rhythm coherence is reflected in the HRV power spectrum as a large increase in power in the low frequency (LF) band (typically around 0.1 Hz) and a decrease in the power in the very low frequency (VLF) and high frequency (HF) bands. A coherent heart rhythm can therefore be defined as a relatively harmonic (sine-wave-like) signal with a very narrow, high-amplitude peak in the LF region of the HRV power spectrum and no major peaks in the VLF or HF regions. Coherence thus approximates the LF/(VLF + HF) ratio. (See Appendix A for an explanation of the HRV power spectrum and a description of the physiological significance of the different frequency bands.)

A method of quantifying heart rhythm coherence is shown in Figure 2. First, the maximum peak is identified in the 0.04–0.26 Hz range (the frequency range within which coherence and entrainment can occur). The peak power is then determined by calculating the integral in a window 0.030 Hz wide, centered on the highest peak in that region. The total power of the entire spectrum is then calculated. The coherence ratio is formulated as:

(Peak Power / (Total Power – Peak Power)) (Childre & Martin, 1999)

This method provides an accurate measure of coherence that allows for the nonlinear nature of the HRV waveform over time.

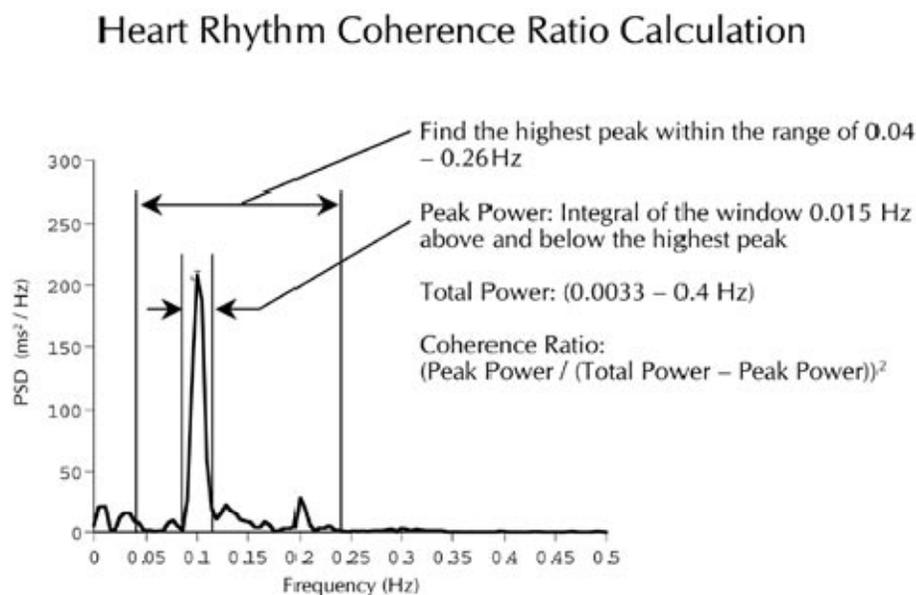


Figure 2. Heart rhythm coherence ratio calculation.

Physiological Correlates

At the physiological level, psychophysiological coherence embraces several related phenomena—autocoherence, entrainment, synchronization, and resonance—which are associated with increased order, efficiency, and harmony in the functioning of the body's systems. As described above, this mode is associated with increased coherence in the heart's

rhythmic activity (autocoherence), which reflects increased ANS synchronization and manifests as a sine-wave-like heart rhythm pattern oscillating at a frequency of approximately 0.1 Hz. Thus, in this mode the HRV power spectrum⁶ is dominated by a narrow-band, high-amplitude peak near the center of the low frequency band (see Figures 3 below and 8 in Appendix A) (McCraty et al., 1995; Tiller et al., 1996).

Another physiological correlate of the coherence mode is the phenomenon of resonance. In physics, resonance refers to a phenomenon whereby an unusually large oscillation is produced in response to a stimulus whose frequency is the same as, or nearly the same as, the natural vibratory frequency of the system. The frequency of the vibration produced in such a state is defined as the resonant frequency of the system. When the cardiovascular system is operating in the coherence mode, it is essentially oscillating at its resonant frequency; this is reflected in the distinctive high-amplitude peak in the HRV power spectrum around 0.1 Hz. Most mathematical models show that the resonant frequency of the human cardiovascular system is determined by the feedback loops between the heart and brain (Baselli et al., 1994; DeBoer, Karemaker, & Strackee, 1987). In humans and in many animals, the resonant frequency of the system is approximately 0.1 Hz, which is equivalent to a 10-second rhythm. The system naturally oscillates at its resonant frequency when an individual is actively feeling a sustained positive emotion such as appreciation, compassion, or love, (McCraty et al., 1995) although resonance can also emerge during states of deep sleep.

Furthermore, increased heart-brain synchronization is observed during coherence; specifically, the brain's alpha rhythms exhibit increased synchronization with the heartbeat in this mode. This finding is discussed in greater depth in Appendix D.

Finally, there tends to be increased cross-coherence or entrainment among the rhythmic patterns of activity generated by different physiological oscillatory systems. Entrainment occurs when the frequency difference between the oscillations of two or more nonlinear systems drops to zero by being "frequency pulled" to the frequency of the dominant system. As the body's most powerful rhythmic oscillator, the heart can pull other resonant physiological systems into entrainment with it. During the psychophysiological coherence mode, entrainment is typically observed between heart rhythms, respiratory rhythms, and blood pressure oscillations; however, other biological oscillators, including very low frequency brain rhythms, craniosacral rhythms, and electrical potentials measured across the skin, can also become entrained (Bradley & Pribram, 1998; Tiller et al., 1996).

Figure 3 shows an example of entrainment occurring during psychophysiological coherence. The graphs plot an individual's heart rhythm, arterial pulse transit time (a measure of beat-to-beat blood pressure) (Bradley & Pribram, 1998), and respiration rate over a 10-minute period. In this example, after a 300-second normal resting baseline period the subject used a heart-based positive emotion refocusing technique known as Freeze-Frame, (Childre & Martin, 1999) which

⁶ Spectral analysis decomposes the HRV waveform into its individual frequency components and quantifies them in terms of their relative intensity using power spectral density (PSD) analysis. Spectral analysis thus provides a means to quantify the relative activity of the different physiological influences on HRV, which are represented by the individual oscillatory components that make up the heart rhythm.

involves focusing attention in the area of the heart while self-generating a sincere positive emotion, such as appreciation. After the subject used the Freeze-Frame technique, the three rhythms shifted from an erratic to a sine-wave-like pattern (indicative of the coherence mode) and all entrained at a frequency of 0.12 Hz. (Tiller et al., 1996). The entrainment phenomenon is thus an example of a psychophysiological state in which there is increased coherence within each system (autocoherence) *and* among multiple oscillating systems (cross-coherence) as well. This example also illustrates how the intentional generation of a self-regulated positive emotional state can bring about a phase-shift in physiological activity, driving the physiological systems into a globally coherent mode of function.

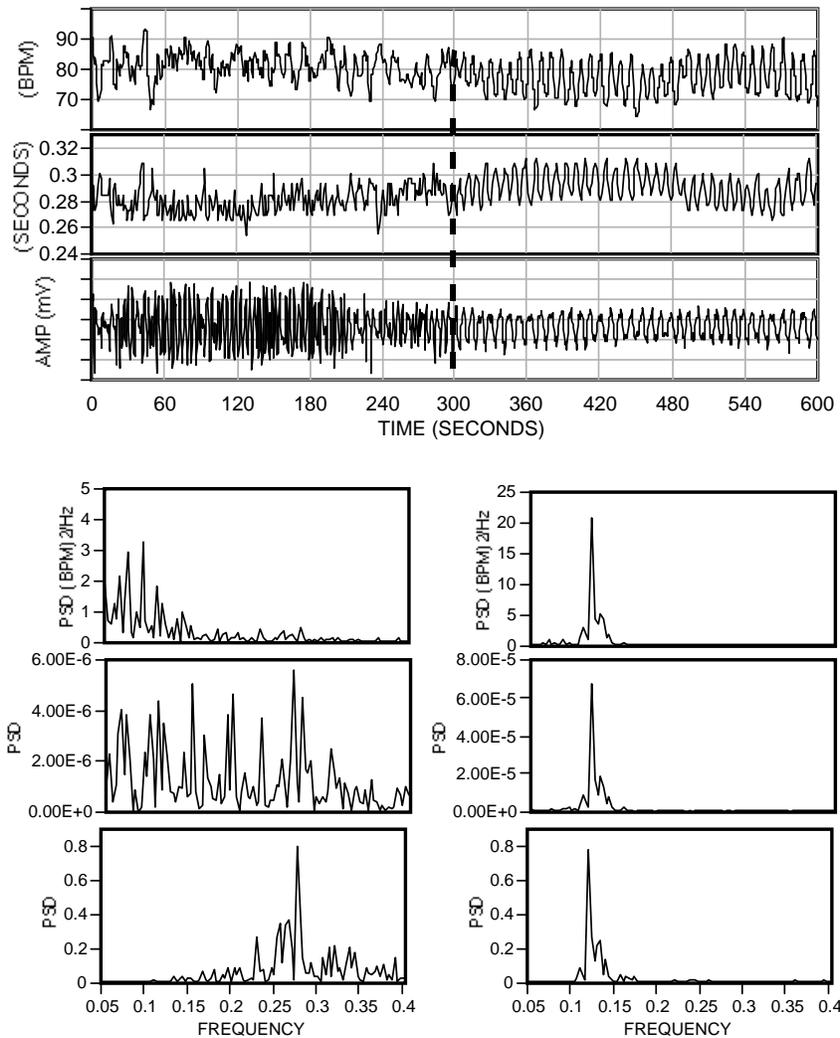


Figure 3. Entrainment. The top graphs show an individual’s heart rate variability, pulse transit time, and respiration rhythms over a 10-minute period. At the 300-second mark, the individual used the Freeze-Frame positive emotion refocusing technique, causing these three systems to come into entrainment. The bottom graphs show the frequency spectra of the same data on each side of the dotted line in the center of the top graph. Notice the graphs on the right show that all three systems have entrained to the same frequency.

Psychological and Behavioral Correlates

The experience of the coherence mode is also qualitatively distinct at the psychological level. This mode is associated with reduced perceptions of stress, sustained positive affect, and a high degree of mental clarity and emotional stability. In Appendix C we also present data indicating that coherence is associated with improved sensory-motor integration, cognition, and task performance. In addition, individuals frequently report experiencing a notable reduction in internal mental dialogue, increased feelings of inner peace and security, more effective decision making, enhanced creativity, and increased intuitive discernment when engaging this mode.

In summary, psychophysiological coherence is a distinctive mode of function driven by sustained, modulated positive emotions. At the psychological level, the term “coherence” is used to denote the high degree of order, harmony, and stability in mental and emotional processes that is experienced during this mode. Physiologically speaking, “coherence” is used here as a general term that encompasses entrainment, resonance, and synchronization—distinct but related phenomena, all of which emerge from the harmonious activity and interactions of the body’s subsystems. Physiological correlates of the coherence mode include: increased synchronization between the two branches of the ANS, a shift in autonomic balance toward increased parasympathetic activity, increased heart–brain synchronization, increased vascular resonance, and entrainment between diverse physiological oscillatory systems.

Drivers of Coherence

Although the physiological phenomena associated with coherence can occur spontaneously, sustained episodes are generally rare. While specific rhythmic breathing methods may induce heart rhythm coherence and physiological entrainment for brief periods, cognitively directed paced breathing is difficult for many people to maintain for more than about one minute (discussed in detail later). On the other hand, we have found that individuals can intentionally maintain coherence for extended periods by self-generating, modulating, and sustaining a “heart-focused” positive emotional state. Using a positive emotion to drive the coherence mode appears to excite the system at its resonant frequency, and coherence emerges naturally, making it easy to sustain for long periods.

Self-regulation of emotional experience is a key requisite to the intentional generation of sustained positive emotions—the driver of a shift to coherent patterns of physiological activity. Emotional self-regulation involves moment-to-moment management of distinct aspects of emotional experience. One aspect involves the neutralization of inappropriate or dysfunctional negative emotions. The other requires that self-activated positive emotions are modulated to remain within the resonant frequency range of such emotions as appreciation, compassion, and love, rather than escalating into feelings such as excitement, euphoria, and rapture, which are associated with more unstable psychophysiological patterns.

A series of tools and techniques, collectively known as the HeartMath System, provide a systematic process that enables people to self-regulate emotional experience and reliably generate the psychophysiological coherence mode (Childre & Martin, 1999; Childre & Rozman, 2002, 2005). The primary focus of these techniques is on facilitating the intentional generation of

a sustained, heart-focused positive emotional state. This is accomplished by a process that combines a shift in attentional focus to the area of the heart (where many people subjectively experience positive emotions) which the self-induction of a positive feeling, such as appreciation. Our work has shown that this shift in focus and feeling experience allows the coherence mode to emerge naturally and helps to reinforce the inherent associations between coherence and positive feelings. Our research also suggests that the intentional application of these coherence-building techniques, on a consistent basis, effectively facilitates a *restructuring process* whereby coherence becomes increasingly familiar to the brain and nervous system, and thus progressively becomes established in the neural architecture as new, stable psychophysiological baseline or set point (McCraty, 2003; McCraty & Childre, 2004; McCraty & Tomasio, 2006). Once the coherence mode is established as the familiar pattern, the system then strives to maintain this mode automatically, thus rendering coherence a more readily accessible state during day-to-day activities, and even in the midst of stressful or challenging situations.

At the physiological level, the occurrence of such a restructuring process is supported by electrophysiological evidence demonstrating a greater frequency of spontaneous (without conscious practice of the interventions) periods of heart rhythm coherence in individuals practiced in the HeartMath coherence-building techniques. Furthermore, a number of studies suggest that this “restructuring” process can produce enduring system-wide benefits that significantly impact overall quality of life (discussed below).

While evidence clearly shows that the HeartMath positive emotion refocusing and emotional restructuring techniques lead to increased psychophysiological coherence, other approaches have also been shown to be associated with increased coherence. For example, in a recent UCLA study, Buddhist monks meditating on generating compassionate love tended to exhibit increased coherence, and another study of Zen monks found that the more advanced monks tended to have coherent heart rhythms, while the novices did not (Lehrer et al., 2003). This does not imply, however, that all meditation approaches lead to coherence; as we and others have observed, approaches that focus attention to the mind (concentrative meditation), and not on a positive emotion, in general do not induce coherence.

Benefits of Psychophysiological Coherence

In terms of physiological functioning, coherence is a highly efficient mode that confers a number of benefits to the system. These include: (1) resetting of baroreceptor sensitivity, which is related to improved short-term blood pressure control and increased respiratory efficiency; (2) increased vagal afferent traffic, which is involved in the inhibition of pain signals and sympathetic outflow; (3) increased cardiac output in conjunction with increased efficiency in fluid exchange, filtration, and absorption between the capillaries and tissues; (4) increased ability of the cardiovascular system to adapt to circulatory requirements; and (5) increased temporal synchronization of cells throughout the body. This results in increased system-wide energy efficiency and metabolic energy savings (Lehrer et al., 2003; Langhorst, Schulz, & Lambertz, 1984; Siegel et al., 1984).

Psychologically, the coherence mode promotes a calm, emotionally balanced, yet alert and responsive state that is conducive to cognitive and task performance, including problem-solving, decision-making, and activities requiring perceptual acuity, attentional focus, coordination, and discrimination. Individuals generally experience a sense of enhanced subjective well-being during coherence due to the reduction in extraneous inner “noise” generated by the mental and emotional processing of daily stress and the positive emotion-driven shift to increased harmony in bodily processes. Many also report increased intuitive clarity and efficacy in addressing troublesome issues in life.

The use of coherence-building interventions has been documented in numerous studies to give rise to significant improvements in key markers of both physical and psychological health. Significant improvements in several objective health-related measures have been observed, including immune system function (McCraty et al., 1996; Rein et al., 1995), ANS function and balance (McCraty et al., 1995; Tiller et al., 1996), and the DHEA/cortisol ratio (McCraty et al., 1998). At the emotional level, significant reductions in depression, anxiety, anger, hostility, burnout, and fatigue and increases in caring, contentment, gratitude, peacefulness, and vitality have been measured across diverse populations (Arguelles, McCraty, & Rees, 2003; Barrios-Choplin, McCraty, & Cryer, 1997; Luskin et al., 2002; McCraty et al., 1998; McCraty, Atkinson, Lipsenthal, et al. 2003; McCraty, Atkinson, & Tomasino, 2001, 2003). Other research has demonstrated significant reductions in key health risk factors (e.g., blood pressure, glucose, cholesterol) (McCraty, Atkinson, Lipsenthal, et al., 2003) and improvements in health status and quality of life in various populations using coherence-building approaches. More specifically, significant blood pressure reductions have been demonstrated in individuals with hypertension (McCraty, Atkinson, & Tomasino); improved functional capacity and reduced depression in patients with congestive heart failure (Luskin et al.); improved glycemic regulation and quality of life in patients with diabetes (McCraty, Atkinson, & Lipsenthal, 2000); and improvements in asthma (Lehrer, Smetankin, & Potapova, 2000). Coherence-building interventions have also been found to yield favorable outcomes in organizational, educational, and mental health settings (Arguelles et al., 2003; Barrios-Choplin et al.; Barrios-Choplin, McCraty, Sundram, & Atkinson, 1999; McCraty et al., 2001; McCraty, Atkinson, Lipsenthal, et al.; McCraty, Atkinson, Tomasino, Goelitz, & Mayrovitz, 1999; McCraty & Childre, 2004; McCraty & Tomasino, 2004).

In short, our findings on psychophysiological coherence essentially substantiate what human beings have known intuitively for thousands of years: namely, that positive emotions not only feel better subjectively, but they also increase the synchronous and harmonious function of the body’s systems. This optimizes our health, well-being, and vitality, and enables us to function with greater overall efficiency and effectiveness.

A Typology of Psychophysiological Interaction

In the Appendix A we identify six distinct patterns of HRV, which appear to denote six different modes of psychophysiological interaction. Four of these modes are readily generated in the context of everyday life. We have termed these *Mental Focus*, *Psychophysiological Incoherence*, *Relaxation* and *Psychophysiological Coherence*. Two further modes, *Emotional Quiescence* and *Extreme Negative Emotion*, are generated under more extraordinary life circumstances. This appendix provides empirical data and detailed descriptions for each of these.

Looking more closely at our data, we found a number of empirical clues that point to a more fundamental conceptualization of the relationship between HRV patterns (which include both heart rate and rhythm) and different emotional states. The first clue is that there is a general relationship between coherence and emotional valence, in that positive emotions are associated with physiological coherence and negative emotions with incoherence. The second clue is that, for certain emotions, we found a relationship between the morphology of the HRV waveforms and specific emotional states. The third finding of significance here is that we also found evidence of HRV waveform patterns (namely, those characteristic of the Emotional Quiescence and Extreme Negative Emotion modes) that appear to involve a rapid phase transition into a qualitatively different category of physiological function. In short, the empirical generalization suggested by these findings is that the morphology of HRV waveforms covaries with different emotional experiences.

Following the logic of this general relationship, we can thus use the six psychophysiological modes to construct a typology—a conceptual “map”—showing the expected relationship between different categories of subjective emotional experience and the different patterns of physiological activity associated with them (see Figure 4). This general theoretical scheme applies to normal, healthy individuals experiencing emotions and feelings of relatively short duration (minutes to hours).

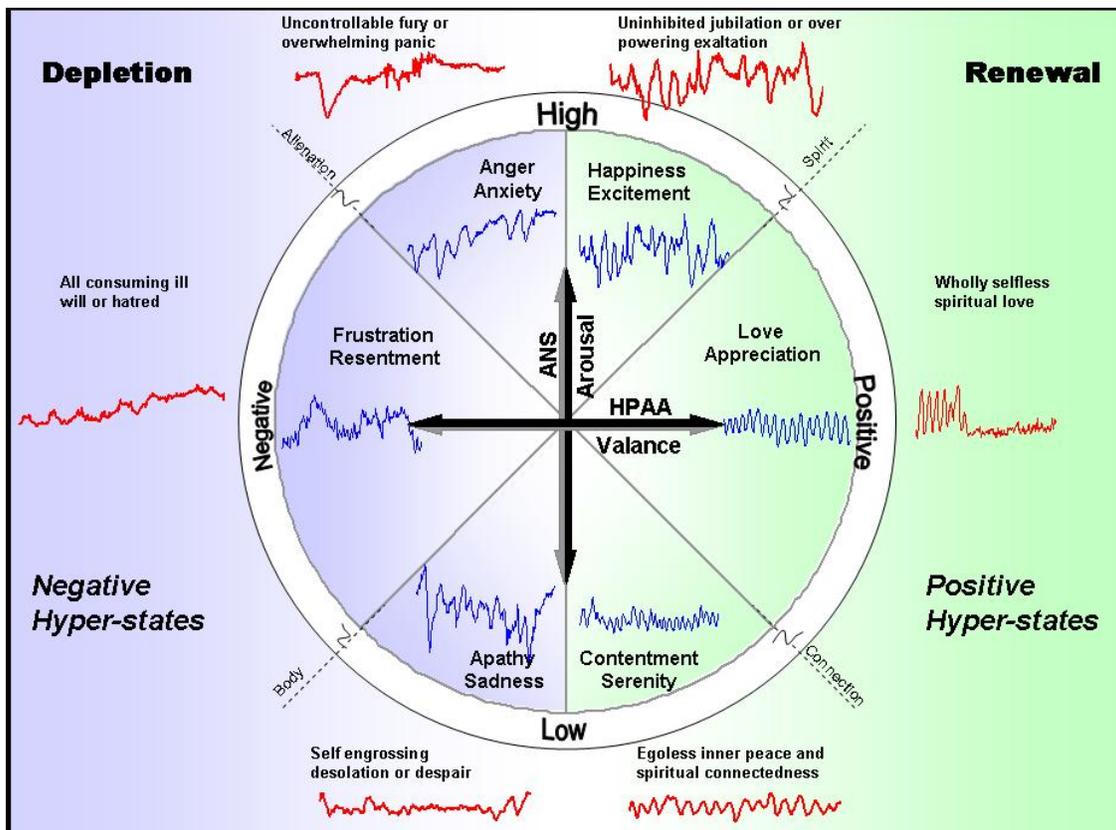


Figure 4. Graphic depiction of everyday states and hyper-states of psychophysiological interaction distinguished by the typology. Two qualitatively different categories of psychophysiological interaction are depicted—the area within the inner circle represents the

range of emotional experience of “normal,” everyday life; the area beyond the outer circle represents psychophysiological hyper-states of extreme emotional experience. The psychophysiological transition from one region to another involves an abrupt phase transition, which is depicted graphically by the white space between the two circles. Two dimensions differentiate the varieties of emotional experience shown; for simplification, the relevant psychological and physiological variables are superimposed on the axis for each dimension. One dimension is the degree of *emotional arousal* (vertical axis, high to low)—known to be covariant with ANS balance. The second dimension is the *valence* of the emotion (horizontal axis, positive or negative)—assumed covariant with the degree of activation of the hypothalamic-pituitary-adrenal (HPA) axis. Different patterns of HRV are predicted from the particular combination of arousal and valence values on the two dimensions. Within the inner circle are six segments, each of which demarcates a range of emotion experienced in everyday life. Typical HRV patterns associated with each emotion are shown. The area beyond the outer circle depicts six hyper-states, in which intense emotional experience drives the activity of physiological systems past normal function into extreme modes. The known and predicted HRV waveform patterns associated with these hyper-states are also shown. The labels “Depletion” and “Renewal,” on the left and right-hand side of the diagram, respectively, highlight the relationship between the valence of feelings and emotions experienced and the psychophysiological consequences for the individual. Negative emotional states can lead to emotional exhaustion and depletion of physiological reserves. By contrast, positive emotional states are associated with increased psychophysiological efficiency and regeneration.

Although the mapping is not isomorphic between data and concept, the typology provides a compelling and fruitful way of conceptualizing and organizing these phenomena. In addition to offering some understanding of the relationships between different types of emotional experience and their associated physiological processes, this scheme also aims to *predict* the distinguishing physiological correlates of emotional states that, to our knowledge, have yet to be empirically described.

The typology distinguishes between two general classes of psychophysiological interaction. One class reflects “normal” psychophysiological states associated with the variety of subjective experiences of everyday life. This area is represented by the space within the inner circle shown in Figure 4. This area has been divided into six segments, each representing a different basic range of emotion. The second class is a qualitatively different category of psychophysiological interaction associated with extreme emotional experience, represented by the space beyond the outer perimeter of the circle in the figure. Because the patterns of psychophysiological interaction in this space are predicted to show an abrupt movement—a phase shift—from patterns associated with feelings typically experienced in everyday life to qualitatively distinct psychophysiological patterns associated with the experience of extreme positive or extreme negative emotions, well beyond the range of normal feelings, we have labeled them as *hyper-states*. Evidence of such a phase shift can clearly be seen as an abrupt reduction in amplitude and a corresponding increase in frequency in the waveform patterns showing the movement from Psychophysiological Coherence to the Emotional Quiescence, a positive hyper-state (Figure 9, Appendix A) and also in the movement from Psychophysiological Incoherence to Extreme Negative Emotion, a negative hyper-state (Figure 10, Appendix A).

Two dimensions common to the phenomenon of psychophysiological interaction provide the basis for differentiating varieties of emotional experience in the typology. As evident in the term “psychophysiological,” there is a psychological element and a physiological element.⁷ For purposes of simplification, we have superimposed the relevant psychological and physiological variables on the axis representing each dimension in the figure.⁸ One dimension is the degree of *emotional arousal* (high to low), which is known to be covariant with ANS balance. Thus, during short-term emotional experiences, the relative balance between the activity of the sympathetic and parasympathetic branches of the ANS is driven by the degree of emotional arousal. Accordingly, we have mapped emotional arousal and ANS balance together on the vertical axis in Figure 4.

The second dimension is the *valence* (positive or negative) of the emotion, which is represented by the horizontal axis in Figure 4. Again for purposes of simplification, the valence is assumed to be covariant with the degree of activation of the hypothalamic-pituitary-adrenal (HPA) axis, which controls the release of cortisol. For short-term emotional experiences, there is an increase in cortisol during negative emotional states and a decrease in cortisol release during positive emotional states.

HRV patterns can be distinguished on the basis of amplitude, frequency, and degree of coherence. Empirical findings show that the two elements of the psychological dimension in our scheme play a predominant role in determining the characteristics of the HRV pattern. The amplitude of the HRV waveform is modulated by both the degree of emotional arousal (which corresponds to ANS activation) and emotional valence. In general, greater degrees of arousal within normal heart rate ranges produce waveforms of greater amplitude.⁹ However, as heart rate increases, the amplitude of the HRV waveform decreases in linear relationship to heart rate until it reaches a point beyond which the amplitude of the HRV waveform is compressed. This is due to a biological constraint known as the cycle-length dependence effect. In terms of emotional valence, the amplitude of the HRV waveform increases during positive emotions, while it decreases during negative emotions. The frequency of the HRV waveform is influenced by the pattern of ANS activation; increased parasympathetic activity leads to higher-frequency (faster) changes in the heart rhythm, while increased sympathetic activity is associated with lower-frequency, higher-amplitude (slower) changes. Finally, the degree of coherence of the HRV waveform is largely determined by the emotional valence, with positive emotion increasing coherence and negative emotion decreasing coherence. Different patterns of HRV can therefore

⁷ Although the psychological component involves at least three factors for a given emotional experience—emotional arousal, emotional valence, and the degree of cognitive engagement—we have excluded cognitive engagement to avoid the enormous complexity introduced when all three factors are considered simultaneously.

⁸ In reality the relationship is much more complicated. While there is a close intra-relationship between each pair of variables on the axis, there are many life circumstances that give rise to a more complex interaction between the emotional and physiological levels.

⁹ A secondary modulator of the HRV amplitude is the degree of cognitive engagement. High cognitive engagement tends to reduce HRV, while low cognitive engagement increases HRV. As noted, for purposes of simplification this factor is not considered in this model.

be predicted from the conjunction of the particular combination of arousal and valence values on the two dimensions in our typology.

Following this logic, therefore, each of the six segments within the inner circle in Figure 4 demarcates a range of emotion and its corresponding representative HRV waveform patterns for the variety of emotional experiences that typify everyday life. Organized in terms of degree of arousal and valence, and rotating clockwise around the figure, these are the familiar emotions we experience from day to day. They are labeled: Happiness–Excitement, Love–Appreciation, Contentment–Serenity, Sadness–Apathy, Frustration–Resentment, and Anger–Anxiety. At the center of the circle, in a small area surrounding the intersection of the two axes, is the space of Emotional Impassivity (not labeled in Figure 4). Involving little or no emotional feeling, either positive or negative, emotional impassivity is typically experienced when the individual is mentally engaged in performing a familiar action or routine task. These seven areas within the circle of day-to-day emotional life denote substantively different emotions and feelings subjectively experienced by the individual.

Psychophysiological Hyper-States

Qualitatively distinct from the feelings of daily life are six distinct *psychophysiological hyper-states* reflecting the body's response to extreme emotions. Because these hyper-states involve a phase shift in physiological organization and psychological experience that is discontinuous from the states of normal, everyday emotional life, they are set apart beyond the perimeter of the outer circle in Figure 4.

Generally speaking, the psychophysiological hyper-states are indicative of two quite different directions of movement in bodily processes. As described below, hyper-states involving extreme positive emotions are transcendent states in which the individual's emotional experience involves the feeling of spiritual connectedness to something larger and more enduring beyond themselves. Typically these states are associated with selfless actions and are also generative of bodily renewal. By contrast, hyper-states of extreme negative emotions are all-consuming states of self-absorption and self-focus. These states are usually associated with highly destructive behavior—either directed at the self and/or projected out onto others—and have detrimental, even devastating, consequences. Negative hyper-states lead to a depletion of the body's energy and resources which, in the long term, results in the degeneration of bodily function.

Shown beyond the high end of the arousal axis are two states of hyper-arousal characterized by extreme emotional activation. The extreme emotional activation can result in a loss of self-control, which may lead to unpredictable behavior. It is important to understand that these extreme emotions are associated with the highest level of physiological activation. This drives the heart rate past physiological norms to such a degree that the amplitude of the HRV waveform becomes extremely low.

On the negative side, violent, uncontrollable anger and rage, or overwhelming fear and anxiety are the hyper-aroused emotions experienced here. As already mentioned, we have empirical data documenting the HRV pattern associated with this state (see the waveform pattern showing the movement to “intense anger” in Figure 10, Appendix A). On the positive side,

uninhibited rejoicing and jubilation, or overpowering exaltation and ecstasy are predicted, in the absence of any empirical data documenting this hyper-state. We believe it is this psychophysiological state that is accessed during collective rituals that lead to trance states and spiritual rapture. It also may be possible to enter this state from hyper-aroused, uncontrolled positive emotions that induce a positive hysteria, such as can result from an unexpected, overwhelmingly positive event—for example, reuniting with a loved one who was in a life-threatening situation.

At the low end of the arousal axis are two states of hypo-arousal, the complement to the two states of hyper-arousal we have just described. On the positive side, the individual experiences an ego-less feeling of profound inner peace and deep spiritual connectedness. Typically, this state is accessed by self-disciplined meditative and spiritual practice. Physiologically, the emotional experience of this state of extremely low arousal is characterized by HRV waveform patterns of very low amplitude with some degree of coherence, reflecting the body's state of complete calm and rest.

On the negative side, individuals can enter a state of hypo-arousal when they have been in an enduring negative emotional state (weeks to months). This is a state of self-engrossing desolation and despair and is accompanied by obsessive negative mental and emotional activity, such as that experienced in prolonged grief or long-term depression. However, an episode of severe trauma or negative emotion can rapidly propel an individual into this state. Either way, this can result in a depletion of physiological reserves, which is in turn reflected in a very low-amplitude HRV waveform. Often, individuals in this hypo-state are emotionally numb and socially alienated or withdrawn.

If this state is sustained on a long-term basis, there is further depletion of both the sympathetic and parasympathetic systems. In the first stages of this process, sympathetic activity becomes substantially reduced, resulting in an autonomic imbalance. As the process continues, parasympathetic activity (vagal tone) is correspondingly reduced. The process culminates with a phase-transition into exhaustion and breakdown.

Between the four states of extreme hyper-arousal and extreme hypo-arousal in the mid-range of emotional arousal, are two other states of extraordinary emotional experience. On the positive side, there is the state of wholly self-less spiritual love in which the individual experiences a deep feeling of all-embracing “big love”—*Agape*, as defined by the dictionary: a love that is open to and non-judgmental about all perceptions, cognitions, and intuitions. To enter this hyper-state requires a deep, heart-focused, self-less love, which can be associated with contemplative introspection. This hyper-state is accessed via a phase transition when this deep heart-focused introspection is sustained for a few minutes or more. This state is experienced as a substantial reduction in mental and emotional “chatter” to a point of internal quietness, often associated with a profound feeling of peace and serenity. This is the phase space within which the Emotional Quiescence mode falls. We also expect this hyper-state to be associated with other types of emotional experience that may have a spiritual dimension, such as those accessed by a number of introspective disciplines and practices.

Physiologically, there are two likely mechanisms to explain how this hyper-state occurs. One is that, in this state, the sympathetic and parasympathetic outflow from the brain to the heart is substantially reduced—reduced to such a degree that the amplitude of HRV waveform becomes very low. The other logical possibility is that the heart acts as an antenna to a field of information beyond space and time surrounding the body that directly informs the heart and modulates its rhythmic patterns. As astounding as this may sound, there is compelling evidence from our study of the electrophysiology of intuition that points in this direction (McCraty, Atkinson, & Bradley, 2004a, 2004b).

On the negative side, there is a hyper-state in which the individual is consumed by powerful malevolent feelings of extreme ill-will and hatred. These ego-centric feelings occupy virtually all of the individual's time and energy and engage one's whole attention. Typically, these feelings of evil and harm are not directed inwards against the self, but, instead, are projected outwards to be expressed as an intense pathological desire to cause great pain and suffering to others. Sustained, fanatical feelings of ill-will toward others can propel an individual into this hyper-state. Subjectively, there is a substantial reduction in mental and emotional "chatter" and a correspondingly heightened state of calm, malevolent feelings. The emotional calm reflects the individual's disassociation from the humanity of others and the total acceptance of the all-consuming negative thoughts and emotions experienced in this state. We expect this hyper-state to be one that can be entered by individuals who hold fanatical beliefs based on extreme negative stereotypes or caricatures of others. This is often the case with radical groups on the margins of society who see themselves suffering a great injustice or harm from the hands of those they hate.

Physiologically, this hyper-state likely involves a zombie-like state in which there is such emotional disassociation that the amplitude of HRV waveform becomes very low but with some variability spikes which may reflect the individual's momentary transitions between different emotions.

To conclude, the typology provides a more general conceptual framework from which to view the six modes of psychophysiological interaction we identified in our empirical studies. We have found the typology a useful way of conceptually organizing the broad range and highly variable phenomena in this domain. It will be up to future research to test the degree to which the typology offers a fruitful map of the nature and organization of the different types of emotional–physiological interaction.

Heart Coherence and Psychophysiological Function

So far, we have discussed how changes in the patterns of neural activity can encode and transmit information in the psychophysiological networks independent of changes in the amount of activity and how this level of information processing may well play a more fundamental role in information exchange than changes in the amount and/or intensity of neural activity. In this section we will see that increased coherence is associated with favorable changes in various aspects of physiological function, which in turn are associated with psychological benefits. We introduce this discussion by describing how the amount of information traveling through the afferent nerves increases during coherence, and we then examine the role that cardiac afferent

input plays in the neural pathways involved in pain perception, respiratory function, emotional processing, and cognitive performance.

Vagal Afferent Traffic

The vagus nerve is a major conduit through which afferent neurological signals from the heart and other visceral organs are relayed to the brain. Psychophysicologist Paul Lehrer has shown that by using heart rhythm feedback to facilitate a state of physiological coherence (which he calls “resonance”), a lasting increase in baroreflex gain¹⁰ is accomplished independent of respiratory and cardiovascular changes, thus demonstrating neuroplasticity of the baroreflex system (Lehrer et al., 2003). This shift in baroreflex gain indicates that with repeated episodes of coherence, the activation threshold of some of the mechanosensory neurons in the baroreflex system is reset and, as a result, these neurons increase their output accordingly.

In addition, a basic property of mechanosensory neurons is that they generally increase their output in response to an increase in the *rate of change* in the function they are tuned to (heart rate, blood pressure, etc.). During heart rhythm coherence, there is an increase in beat-to-beat variability in both heart rate and blood pressure, which is equivalent to an increase in the rate of change. This results in an increase in the vagal afferent traffic sent from the heart and cardiovascular system to the brain. With regular practice in maintaining the coherence mode, it is likely that increased vagal afferent traffic would also be observed even when one is not in this mode. This is due to the fact that the mechanosensory neurons’ threshold is reset as a result of the coherence-building practice, thus establishing a new baseline level of afferent traffic.

Generating an increase in vagal afferent traffic through noninvasive approaches such as heart-based emotion refocusing techniques and heart rhythm coherence feedback has a number of potential benefits. In recent years, a number of clinical applications for increasing vagal afferent traffic have been found; however, the increase in afferent activity is usually generated by implanted or external devices that stimulate the vagal afferent pathways, typically in the left vagus nerve. Vagal stimulation is an FDA-approved treatment for epilepsy and is currently under investigation as a therapy for obesity, depression, anxiety, and Alzheimer’s disease (Groves & Brown, 2005; Kosel & Schlaepfer, 2003). It has been established that an increase in the normal intrinsic levels of vagal afferent traffic inhibits the pain pathways traveling from the body to the thalamus at the level of the spinal cord (discussed below) and a recent study has found that stimulation of the afferent vagal pathways significantly reduces cluster and migraine headaches (Mauskop, 2005). Vagal nerve stimulation has also been shown to improve cognitive processing and memory (Hassert, Miyashita, & Williams, 2004)—findings that are consistent with those of several recent studies of individuals using heart rhythm coherence-building techniques (discussed later in this article).

¹⁰ Baroreflexes are homeostatic reflexes that regulate blood pressure. Through them, increases in blood pressure produce decreases in heart rate and vasodilation, while decreases in blood pressure produce the opposite. Baroreflex gain is commonly calculated as the beat-to-beat change in heart rate per unit of change in blood pressure. Decreased baroreflex gain is related to impaired regulatory capacity and aging.

Pain Perception

Afferent signals from the heart modulate the neural pathways involved in the perception of pain. Numerous reports from individuals using the HeartMath coherence-building techniques indicate that they are able to greatly reduce their experience of bodily pain, often to a point where they can reduce or eliminate pain medications. This is true of both visceral and cutaneous pain. The HeartMath system is currently employed by numerous clinicians as a pain management aid, and has proven effective in patients with a wide range of conditions, including chronic joint pain, serious burns, and traumatic brain injury. The generation of increased vagal afferent activity during the coherence mode provides a likely mechanism to account for the reduction of pain associated with increased heart rhythm coherence.

Several mechanisms have been identified that explain how increased vagal afferent activity decreases pain sensitivity and increases pain threshold. Nociceptive information (pain signals) from the skin and internal organs is carried to cell bodies located in the dorsal root ganglia of the spinal cord. Axons from neurons in the dorsal root ganglia penetrate the spinal cord and convey afferent pain information to localized regions of the gray matter in the cord. From there, afferent information ascends in pathways to both the lateral and medial thalamus. Cells of the lateral thalamus in turn project to the primary somatosensory cortex, where the location, intensity, and duration of the painful stimulus are analyzed. Information is sent from the medial thalamus to the insular cortex, amygdala, and cingulate gyrus, where motivational-affective components of pain, including autonomic adjustments, occur. This pathway is called the spinothalamic tract (STT) and, although not the only pain pathway, it is the main and most studied system that transmits visceral sympathetic afferent pain information to the brain (Foreman, 1989).

Afferent fibers in the vagus nerve participate in the modulation of pain partly by modulating the flow of pain signals in the STT. An increase in afferent vagal activity causes a general inhibitory effect at most levels of the spinal cord on neurons that transmit nociceptive information to the thalamus and then to areas of the brain involved in pain perception. Vagal afferent fibers terminate primarily in the caudal medulla of the brain stem and nucleus tractus solitarius (NTS), and evidence shows that suppression of spinal neuronal activity is dependent upon the NTS connections. It has been demonstrated that the cardiac branch of the vagus nerve makes up the major contribution for the inhibitory responses on the spinal pain signals and that left vagal stimulation suppresses approximately 60% of the STT cells. Thus, the predominant effect of increased vagal afferent activity, which is associated with increased coherence, is the suppression of somatic and visceral input to STT cells, which provides a mechanism for decreasing pain (Foreman, 1994, 1997).

Respiration

It is well known that the respiratory rhythm modulates the pattern of the heart rhythm. This breath-related modulation of the heart rhythm is called respiratory sinus arrhythmia (RSA) (Hirsh & Bishop, 1981). RSA reflects the complex interaction of central respiratory drive, autonomic afferent signals, efferent outflow from the brain stem, and respiratory mechanics

within the thorax. The phenomenon is dependent on the frequency and amplitude of respiration as well as on the underlying autonomic state of the organism.¹¹

Since we have conscious control over our breathing, cognitively-directed breathing exercises can be used to *impose* a breathing rhythm on the heart rhythms. Thus, when we breathe at a slow, rhythmic rate (five seconds in and then five seconds out), we can facilitate coherence and entrainment. However, we do not normally think about our breathing. It is automatic; our breathing depth and rate varies without our conscious awareness due to changes in the inputs to the respiratory centers in the brain stem that control respiration.

Among these inputs is the afferent neurological information from the heart and cardiovascular system. Our breathing rate is affected by and often synchronized to the cardiac cycle, which means that changes in our heart rate and rhythm can affect our breathing rate and patterns.¹² During sleep or rest, coupling between the cardiac cycle and respiration is the strongest, and at times of stress, coupling between the heart and respiration becomes disrupted (Langhorst, Schulz, & Lambertz, 1986; Raschke, 1986a, 1986b; Turpin, 1986).

It is well established that changes in emotional states also alter breathing rates. Agitated states such as anger and frustration increase the breathing rate and reduce tidal volume (the depth of the breath), while positive emotional states slow the breathing rate and increase tidal volume. These emotion-related changes in breathing are likely to result, at least in part, from changes in input from the cardiovascular centers.

Because respiration modulates the heart rhythm, it can be intentionally used as a powerful intervention that can have quick and profound body-wide effects. As we have conscious control over our breathing rate and depth, we can consciously modulate the heart rhythm and thus change the afferent neural patterns sent to the brain centers that regulate autonomic outflow, emotion, and cognitive processes. Our experience with breathing exercises is that they are effective primarily due to the fact that they modulate the heart's rhythmic patterns.

However, it is important to emphasize that coherence is associated with positive emotions *independent* of conscious alterations in one's breathing rhythm. In our earlier studies, which were focused on the physiological correlates of different emotional states, instructions to subjects purposely made no mention of altering breathing rates or depths. We found that when sustained positive emotional states were maintained, increased heart rhythm coherence and entrainment

¹¹ The effects of lung inflation are mediated by sensory neurons in the lungs that respond to stretch. These neurons increase their firing rate as the lungs expand upon inspiration. The output from these neurons travels to the brain stem and inhibits the parasympathetic outflow from the brain to the heart, resulting in an increase in heart rate. During expiration, the stretch is reduced and the inhibition is removed. The heart rate is quickly reduced. This interaction between the lungs and brain stem is only one source of RSA; however, it provides an easy way to conceptualize RSA.

¹² The influence of afferent information from the heart on respiration was studied in great detail in the 1940s and 1950s. The cardiovascular afferent systems excite the respiratory centers, and if this input is inhibited, so is respiration. For a review of this earlier research, see Chernigovskiy (1967).

between the heart rhythm, blood pressure rhythms, and respiratory rhythms emerged independent of any conscious alterations in breathing pattern (McCraty et al., 1995; Tiller et al., 1996).

Although breathing techniques may sometimes facilitate a feeling shift, coherence that is driven through the use of such techniques alone does not necessarily shift one's emotional state. For example, it is possible to breathe at a rate of six breaths per minute (a 10-second rhythm) and still be feeling anxiety or other feelings of unease. In addition, many people find it difficult to consciously maintain breathing rates at a 10-second rhythm for more than about a minute. On the other hand, by focusing attention on self-generating a positive emotion while pretending to "breathe" this feeling through the area of the heart in a relaxed manner, smooth, coherent heart rhythm patterns occur naturally and are easier to sustain for longer periods of time. This has the added benefit of not only establishing coherence as the familiar pattern, but also strengthening the connection between the constituent physiological patterns of coherence—of which heart rhythm is key—and the positive feeling state.

Emotional Processing

Afferent input from the heart, and, in particular, the pattern of the heart's rhythm, also plays a key role in emotional experience. As described previously, our research suggested a fundamental link between emotions and changes in the *patterns* of both efferent and afferent autonomic activity, as well as changes in ANS activation, which are clearly reflected in changes in the heart rhythm patterns. The experience of negative emotions is reflected in more erratic or disordered heart rhythms, indicating less synchronization in both the activity of brain structures that regulate parasympathetic outflow and in the reciprocal action between the parasympathetic and sympathetic branches of the ANS. In contrast, sustained positive emotions are associated with a highly ordered or *coherent* pattern in the heart rhythms, reflecting greater overall synchronization in these same systems.

It is important to emphasize, however, that the heart's rhythmic beating patterns not only *reflect* the individual's emotional state, but they also play a direct role in *determining* emotional experience. At the physiological level, as shown in Figure 5, afferent input from the heart is conveyed to a number of subcortical regions of the brain that are involved in emotional processing, including the thalamus, hypothalamus, and amygdala. Moreover, cardiac afferent input has a significant influence on the activity of these brain centers (Adair & Manning, 1975; Cameron, 2002; Foreman, 1997; Frysinger & Harper, 1990; Oppenheimer & Hopkins, 1994; Zhang, Harper, & Frysinger, 1986). For example, activity in the amygdala has been found to be synchronized to the cardiac cycle (Frysinger & Harper, 1990; Zhang et al.). These understandings support the proposition that afferent information from the heart is directly involved in emotional processing and emotional experience.

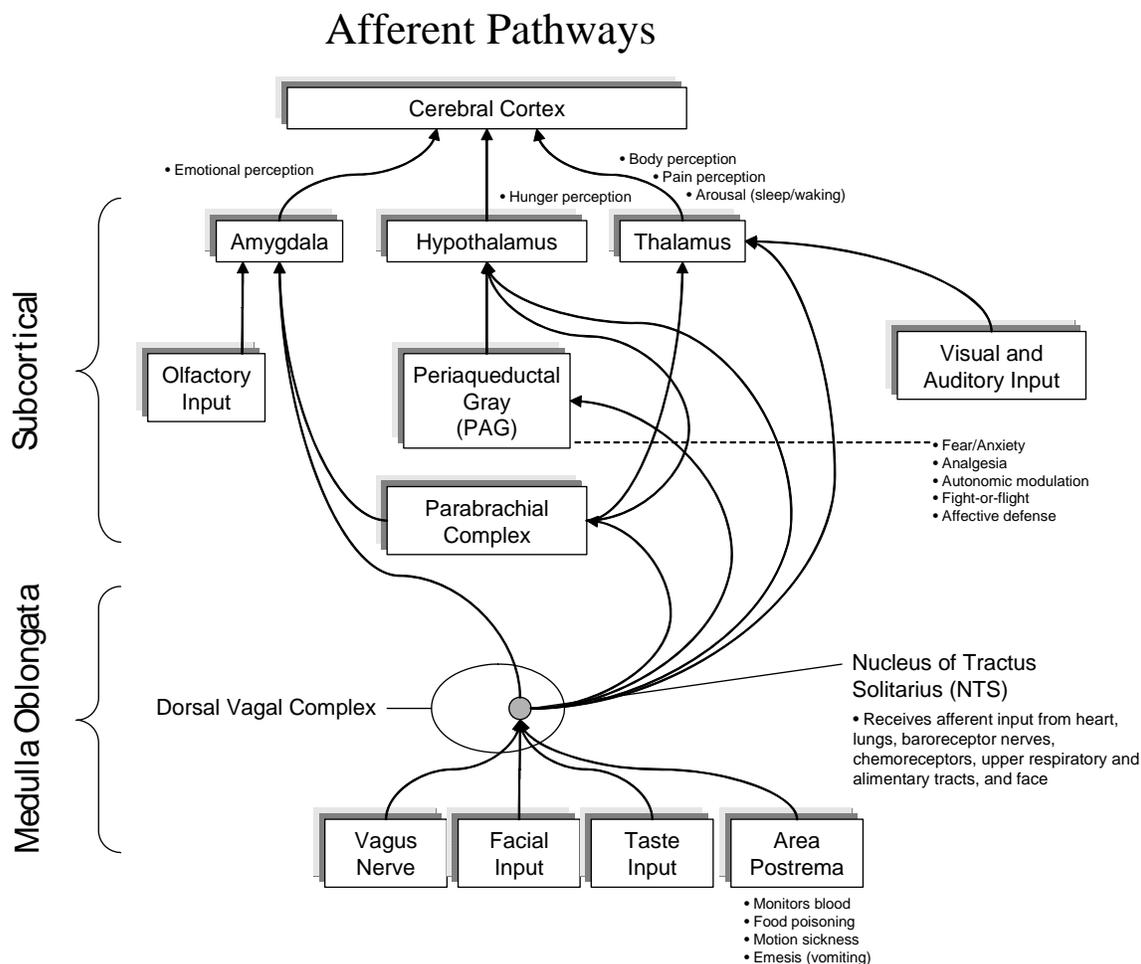


Figure 5. Diagram of the currently known afferent pathways by which information from the heart and cardiovascular system modulates brain activity. Note the direct connections from the NTS to the amygdala, hypothalamus, and thalamus. Although not shown, there is also evidence emerging of a pathway from the dorsal vagal complex that travels directly to the frontal cortex.

These findings and those from our own research led us to ponder the fundamental physiological significance of the covariance between the heart’s rhythms and changes in emotion. This question was especially intriguing in light of current views in neuroscience that the contents of feelings are essentially the configurations of body states represented in somatosensory maps (Cameron, 2002; Damasio, 2003). This was of course the essence of the theory of emotion first proposed by William James (1884), which has been refined by many researchers over the years.

A useful way of understanding how the heart is involved in the processing of emotional experience is to draw on Pribram’s theory of emotion (Pribram & Melges, 1969). In this theory, the brain is viewed as a complex pattern identification and matching system. Pribram’s basic concept is that of a “mismatch” between familiar input patterns and current input patterns that are different or novel. It is this mismatch that provides the mechanism by which feelings and emotions are generated.

According to Pribram's model, past experience builds within us a set of familiar patterns, which are instantiated in the neural architecture. Inputs to the brain from both the external and internal environments contribute to the maintenance of these patterns. Within the body, many processes provide constant rhythmic inputs with which the brain becomes familiar. These include the heart's rhythmic activity; digestive, respiratory and hormonal rhythms; and patterns of muscular tension, particularly facial expressions. These inputs are continuously monitored by the brain and help organize perception, feelings and behavior.

Familiar input patterns form a stable backdrop, or reference pattern, against which new information or experiences are compared. When an input pattern is sufficiently different from the familiar reference pattern, a "mismatch" occurs. This mismatch, or *departure from the familiar pattern*, is what underlies the generation of feelings and emotions. In physiological terms, Pribram suggests that the low-frequency oscillations generated by the heart and bodily systems are the carriers of emotional information, and that the higher frequency oscillations found in the EEG reflect the integration, perception, and labeling of these body states along with perception of sensory input from the external environment. The mismatch between a familiar pattern and a pattern that is new or novel in either of these informational inputs is what activates emotional changes (McCraty, 2003; McCraty & Tomasio, 2006).

Although inputs originating from many different bodily organs and systems are involved in the processes that ultimately determine emotional experience, it is now abundantly clear that the heart plays a particularly important role. The heart is the primary and most consistent source of dynamic rhythmic patterns in the body. Furthermore, the afferent networks connecting the heart and cardiovascular system with the brain are far more extensive than the afferent systems associated with other major organs (Cameron, 2002). Additionally, the heart is particularly sensitive and responsive to changes in a number of other psychophysiological systems. For example, heart rhythm patterns are continually and rapidly modulated by changes in the activity of either branch of the ANS, and the heart's extensive intrinsic network of sensory neurons also enables it to detect and respond to variations in hormonal rhythms and patterns (Armour, 1994). In addition to functioning as a sophisticated information processing and encoding center, (Armour & Kember, 2004) the heart is also an endocrine gland that produces and secretes hormones and neurotransmitters (Cantin & Genest, 1985, 1986; Gutkowska, Jankowski, Mukaddam-Daher, & McCann, 2000; Huang et al., 1996; Mukoyama et al., 1991). As we will see later, with each beat, the heart not only pumps blood, but also continually transmits dynamic patterns of neurological, hormonal, pressure, and electromagnetic information to the brain and throughout the body. Therefore, the multiple inputs from the heart and cardiovascular system to the brain are a major contributor in establishing the dynamics of the familiar baseline pattern or set point against which the current input of "now" is compared.

A striking example illustrates the extensiveness of the influence of cardiac afferent input on emotional experience as well as the operation of the mismatch mechanism. Research shows that psychological aspects of panic disorder are actually frequently created by an unrecognized cardiac arrhythmia. One study found that DSM-IV criteria for panic disorder were fulfilled in more than two-thirds of patients with sudden-onset arrhythmias. In the majority of cases, once the arrhythmia was discovered and treated, the symptoms of panic disorder disappeared (Lessmeier et al., 1997). When the heart rate variability patterns of such an arrhythmia are

plotted, the erratic, incoherent waveform appears quite similar to the heart rhythm pattern produced during strong feelings of anxiety in a healthy person. Because the sudden, large change in the pattern of afferent information is detected by the brain as a mismatch relative to the stable baseline pattern to which the individual has adapted, it consequently results in feelings of anxiety and panic.

The above example illustrates the immediate and profound impact that changes in the heart's rhythmic activity can have on one's emotional experience. In this example—as is usually the case—such changes occur unconsciously. One of the most important findings of our research, however, is that changes in the heart's rhythmic patterns can also be *intentionally generated*. This shift in the heart's rhythmic patterns is one of the physiological correlates of using the HeartMath positive emotion-based coherence-building techniques, which couple an intentional shift in attention to the physical area of the heart with the self-induction of a positive emotional state. We have found that this process rapidly initiates a distinct shift to increased coherence in the heart's rhythms. This, in turn, results in a change in the pattern of afferent cardiac signals sent to the brain, which serves to *reinforce* the self-generated positive emotional shift, making it easier to sustain. Through the consistent use of the coherence-building techniques, the coupling between the psychophysiological coherence mode and positive emotion is further reinforced. This subsequently strengthens the ability of a positive feeling shift to initiate a beneficial physiological shift towards increased coherence, or a physiological shift to facilitate the experience of a positive emotion.

While the process of activating the psychophysiological coherence mode clearly leads to immediate benefits by helping to transform stress in the moment it is experienced, it can also contribute to long-term improvements in emotion regulation abilities and emotional well-being that ultimately affect many aspects of one's life. This is because each time individuals intentionally self-generate a state of psychophysiological coherence, the “new” coherent patterns—and “new” repertoires for responding to challenge—are reinforced in the neural architecture. With consistency of practice, these patterns become increasingly familiar to the brain. Thus, through a feed-forward process, these new, healthy patterns become established as a new baseline or reference, which the system then strives to maintain. It is in this way that HeartMath tools facilitate a *repatting process*, whereby the maladaptive patterns that underlie the experience of stress are progressively replaced by healthier physiological, emotional, cognitive, and behavioral patterns as the “automatic” or familiar way of being (McCraty & Tomasio, 2006).

Coherence and Cognitive Performance

It is now generally accepted that the afferent neurological signals the heart sends to the brain have a regulatory influence on many of the ANS signals that flow from the brain to the heart, to the blood vessels, and to other glands and organs. However, it is less commonly appreciated that these same cardiovascular afferent signals involved in physiological regulation *also* cascade up into the higher centers of the brain and influence their activity and function. Of particular significance is the influence of the heart's input on the activity of the cortex—that part of the brain that governs thinking and reasoning capacities. As we will see, depending on the nature of the heart's input, it can either inhibit or facilitate working memory and attention, cortical

processes, cognitive functions, and performance (Hansen, Johnsen, & Thayer, 2003; Lacey & Lacey, 1974; Rau, Pauli, Brody, Elbert, & Birbaumer, 1993; Sandman, Walker, & Berka, 1982; van der Molen, Somsen, & Orlebeke, 1985).

Our research on psychophysiological coherence has provided new insight into the relationship between heart activity and cognitive performance. The context for this is described in detail in Appendix B. It describes how psychophysiologicalists John and Beatrice Lacey's baroreceptor hypothesis identified a relationship between the heart's activity and cognitive performance. This work was furthered by Christoph Wölk and Manfred Velden in Germany, who identified the importance of heart rate's *pattern* and *stability* in influencing neurological functioning. Although we agree with Wölk and Velden's conclusions, the primary focus of previous work in this area has been on *micro-scale* temporal patterns of cardiac activity, occurring within a single cardiac cycle, or, at most, across 3–4 heartbeats. However, the interactions between the heart and brain are much more complex and also occur over longer time periods (sequences of heartbeats occurring over seconds to minutes). Based on the evidence we report below, we believe that patterns of the heart's rhythmic activity over a longer time scale are also involved in influencing cognitive performance. Moreover, it appears that these *macro-scale* temporal patterns of cardiovascular afferent activity can have a much greater effect on performance than micro-scale patterns. Therefore, a broader hypothesis is called for.

The Heart Rhythm Coherence Hypothesis: A Macro-Scale Perspective

In the course of conducting our studies, we had received numerous reports from individuals able to maintain the psychophysiological coherence mode that their performance in various activities had noticeably improved. These involved faculties and abilities requiring the processing of external sensory information (e.g., speed and accuracy, coordination, and synchronization, such as in sports and the performing arts) as well as processes requiring primarily internal focus (e.g., problem solving, decision making, creativity, and intuition, such as in business and intellectual activities). This led us to postulate that psychophysiological coherence and the associated *macro-scale* patterns of the temporal organization of the heart's rhythmic activity—heart rhythm patterns occurring over seconds to minutes—also have an important effect on cognitive processes and intentional behavior. Focusing on the nature of the organization of the heart's rhythmic activity, which reflects emotional state, we hypothesize that emotion-driven changes in global psychophysiological function, and the resulting change in the pattern of heart rhythm activity, are also directly related to the facilitation or inhibition of the brain processes involved in cognitive function. In specific terms, sustained positive emotions induce psychophysiological coherence, which, in turn, is reflected in increased heart rhythm coherence. Thus, the greater the degree of emotional stability and system-wide coherence, the greater the facilitation of cognitive and task performance. We call this hypothesis the *heart rhythm coherence hypothesis*.

A number of research projects have been carried out to test this hypothesis. Appendix C describes three studies that show evidence supporting the hypothesis. The first showed that macro-scale patterns of cardiac activity can produce a larger effect on the inhibition/facilitation of cognitive performance than the much smaller inhibition/facilitation fluctuations in performance observed by Wölk and Velden. It found an approximately *six times* greater

improvement in performance than previous studies involving similar methods. The second was an independent study conducted in the UK by Dr. Keith Wesnes, who concluded that learning and practicing the HeartMath positive emotion-focused coherence-building techniques appears to enhance an individual's memory capacity and also improves self-reported calmness. The third study was funded by the U.S. Department of Education and carried out with the cooperation of the Claremont Graduate University's School of Educational Studies involving tenth grade students in two large California high schools. It found significant reduction in test anxiety as well as higher test scores for students who learned the positive emotion-focused coherence-building techniques in the TestEdge program.

Overall, the evidence provided by the three studies described in Appendix C indicates that a specific macro-scale pattern of cardiac activity—heart rhythm coherence—is associated with significant improvement in cognitive performance. Not only is this outcome observed in a simple reaction time experiment, but the data suggest that this facilitative effect also extends across more complex domains of cognitive function, including memory and even academic test performance. It also appears that the influence of the coherence mode on cognitive performance is substantially larger in magnitude than that previously documented for changes in cardiac activity patterns on a micro scale.

Assuming these results are validated by other researchers, it is worth considering the likely pathways and mechanisms that could explain these findings. This entails developing an explanation that complements the micro-pattern hypotheses of the Lacey and Wölk and Velden, by identifying other physiological mechanisms that may account for these results. The micro-pattern hypothesis presents a somewhat simplified view of heart–brain interactions, which is not adequate to describe the full range of information communication that takes place between the heart and brain: it only addresses the smaller fluctuations in performance that are associated with physiological changes occurring within a single cardiac cycle or across several heartbeats. As we have seen, however, there are macro-scale temporal patterns that have a significant carry-over effect on cognitive performance. To build an adequate understanding of the physiological mechanisms involved requires developing a deeper understanding of the complexity of heart–brain interactions. This is reflected in the discussion below in three primary ways: first, that the influence of cardiovascular afferent input on the brain is more elaborate than that considered in the micro-pattern hypothesis; second, that afferent input from the heart has effects on brain centers other than the thalamus; and third, that the alpha rhythm is not the only brain rhythm synchronized to the heart.

A More Complex Picture

Complexity of Cardiac Afferent Signals

One of the underlying assumptions of the micro-pattern hypothesis is that there is a one-to-one correspondence between each heartbeat and the burst of neural activity sent to the brain from the cardiac mechanosensory neurites. However, at the level of the macro-scale heart–brain interactions investigated here, the dynamics of the generation and transmission of cardiovascular afferent input involve many types of neurons and a multiplicity of pathways operating over different time scales.

There are approximately 40,000 sensory neurites in the human heart involved in relaying afferent information to the brain. Of these, just 20% are mechanosensory neurons. Of this 20%, only a small proportion actually fire in unison with each heartbeat. Moreover, there are at least five different types of mechanosensory neurons. Almost all mechanosensory neurons are sensitive to rate of change, in that their activity levels increase in a nonlinear manner in response to change in the system. Some increase their firing rate only when blood pressure decreases, while others increase only during pressure increases. Still others are only sensitive to large movements in the rate of change of heart rate or blood pressure (Armour & Kember, 2004). Thus, there is only a minority of sensory neurites whose output activity exhibits a one-to-one relationship to the heartbeat and regional changes in ventricular blood pressure.

To add to the complexity, the heart's intrinsic nervous system has both short-term and long-term memory that affects cardiac function (and thus afferent signals) over two different time scales: (1) variations in activity patterns that occur in response to rapidly occurring alterations in local mechanical status over milliseconds; and (2) variations in activity patterns of a global nature that operate over time scales of seconds to minutes (Armour, 2003; Armour & Kember, 2004). Thus, in addition to the information related to a single cardiac cycle, there is also rhythmic information occurring over longer time scales that may modulate brain activity. The fact that many of the neurons respond primarily to rate of change, and that changes in activity patterns can last for minutes, are important factors in understanding how heart–brain interactions are affected during coherence and can have an extended carry-over effect. This is because in the coherence mode there is an increased rate of change in beat-to-beat variability of both heart rate and blood pressure, in addition to the increased order in the temporal patterns of activity of the cardiovascular system. While it is likely, under normal pressure variations and heart rates, that the overall *amount* of afferent neural activity reaching the brain is the same or nearly the same from one heartbeat to the next, it is our contention that the *macro-scale patterns* of neural activity can be quite different.

In this regard, Wölk and Velden made an important observation in noting that the *frequency* and *stability* of the afferent input were important factors affecting sensory-motor performance (Wölk and Velden, 1989). In this context, however, we suggest that the concept of *activity pattern* is more appropriate than the concept of *frequency*. This is because it is in the interspike interval (the temporal space *between* consecutive spikes of the neural activity) that information is encoded. Thus, it is the overall pattern of activity and *not* merely its frequency that contains the meaning of the information enfolded in the signals. Furthermore, we consider the stability of the pattern over longer time scales, those of seconds to minutes. Therefore, to understand the effects of cardiovascular afferent signals on the brain, the heart's rhythmic pattern over longer time scales must also be considered as an important factor in itself, in addition to those of stimulus intensity, heart rate, and pressure. As we have seen, it is likely that the macro-scale pattern of the heart's activity may have a much greater effect on performance than the within-cardiac cycle effects.

Afferent Input to Brain Centers other than the Thalamus

Another important consideration, in relation to heart–brain interactions, is that while the micro-pattern model focuses solely on cardiovascular input to the thalamus, there are other

neural pathways by which the heart's input can modulate cortical activity and thus performance. As shown in Figure 5, cardiovascular inputs from the vagal afferent nerves first reach the nucleus of tractus solitarius (NTS) and from there travel directly to the parabrachial complex, periaqueductal grey, thalamus, hypothalamus, and amygdala. There are then connections by which the afferent inputs move from the amygdala, hypothalamus, and thalamus to the cerebral cortex. There is also evidence to suggest the existence of afferent pathways from the medulla directly to the prefrontal cortex (McCraty et al., 2004b).

Although this diagram primarily shows the afferent pathways—one-way flow of input to the brain—in most cases the regions are reciprocally interconnected such that information flows in both directions. This reciprocally interconnected network allows for continuous positive and negative feedback interactions and the integration of autonomic responses with the processing of perceptual and sensory information. In addition, the numerous distributed parallel pathways permit multiple avenues to process a given response.

Heart–Brain Synchronization

The third way in which the picture is more complicated is that whereas Wölk and Velden's hypothesis considers only the alpha rhythm, there are other brain rhythms that are also synchronized to the heart. These include the beta rhythm as well as lower frequency brain activity. Thus, it is likely that the effects of macro-scale cardiovascular dynamics on other aspects of brain activity are also important in contributing to larger fluctuations in performance, such as those observed in the studies reported here.

Appendix D presents evidence from a number of studies confirming that a significant amount of alpha rhythm activity is indeed synchronized to the activity of the heart. We have also presented additional evidence showing that Wölk and Velden's contention appears to have an empirical basis, in that we found that the alpha rhythm is synchronized to the cardiac cycle. Moreover, our evidence suggests that alpha synchronization increases during psychophysiological coherence and that other brain rhythms—namely, the beta rhythm and lower frequency brain activity—also appear to be synchronized to the cardiac cycle.

System Dynamics: Centrality of the Heart in the Psychophysiological Network

To this point our concern has been describing the nature, organization, and measurement of six different psychophysiological modes. In particular we have focused on the psychophysiological coherence mode and its impact on various aspects of psychophysiological function, including pain perception, respiration, emotional processing, and cognitive performance. Now we turn to the basic question of system dynamics: how the heart, as the most powerful generator of rhythmic information patterns in the body, acts effectively to bind and synchronize the entire system. This helps explain the mechanisms that underlie the heart's role in the generation of system-wide coherence in the body as a whole. In addition to an overview of research in these areas, we also present our own findings, which, so far as we know, represent an original contribution.

A Systems Approach

Complex living systems, such as human beings, are composed of numerous interconnected, dynamic networks of biological structures and processes. The recent application of systems thinking in the life sciences has given rise to the understanding that the function of the human organism as an integrated whole is determined by the multi-level interactions of all the elements of the psychophysiological system. The elements influence one another in a network fashion rather than through strict hierarchical or cause-effect relationships. Thus, any node within the psychophysiological network—any organ, system, substance, or process—necessarily exerts an impact, whether pronounced or subtle, on the functioning of the system as a whole. And while certain nodes have a greater influence than others in a given network at a particular level of system organization, those nodes that constitute multi-level linkages across different subsystems and scales of organization will have a greater influence on the system as a whole. Abundant evidence indicates that proper coordination and synchronization—i.e., coherent organization—among the lateral and vertical networks of biological activity generated by these structures and subsystems is critical for the emergence of higher-order functions.

As we have seen thus far, one of the primary ways that information is encoded and communicated throughout our psychophysiological systems is in the language of dynamic patterns. In the nervous system, for example, it is well established that information is encoded in the *time interval between action potentials*—and, on a macro-scale, in the intervals between bursts of neural activity. Likewise, in the endocrine system, patterns of “pulses” of hormone release are used to convey biologically relevant information. This is an important principle of operation, as it appears that the body uses this same encoding and transmission strategy—encoding information in the time intervals between pulses of activity—in many systems and across very different time scales. This is biologically efficient in that the body is organized to use a common information communication mechanism across multiple systems.

There is substantial evidence that the heart plays a unique role in synchronizing the activity in multiple systems of the body and across different levels of organization, and thus in orchestrating the flow of information throughout the psychophysiological network. As the most powerful and consistent generator of rhythmic information patterns in the body, and possessing a far more extensive communication system with the brain than other organs, the heart is in continuous connection with the brain and other bodily organs and systems through multiple pathways: *neurologically* (through the transmission of neural impulses), *biochemically* (through hormones and neurotransmitters), *biophysically* (through pressure and sound waves), and *energetically* (through electromagnetic field interactions).

As we discuss each of these main communication pathways in more detail, it will become clear that the heart is a central node in the psychophysiological network that influences multiple systems, and is thus uniquely positioned to integrate and communicate information both across systems and throughout the whole organism. Because of the extensiveness of the heart’s influence on the physiological, cognitive, and emotional systems, the heart provides a point of access from which the dynamics of bodily processes can be quickly and profoundly affected. From this perspective, we will also see how intentional interventions that increase coherence in

the heart's rhythms can facilitate a rapid shift to the psychophysiological coherence mode, with profound system-wide consequences.

In the light of these ideas, we can now postulate that information relative to global-scale integration (the organization and function of the body as whole) is encoded in the interbeat intervals of the heartbeat. Thus, the heart effectively acts as the central “conductor” of rhythmic activity in the body: the neural, hormonal, biophysical, and energetic patterns generated by the heart's rhythmic activity provide a global synchronizing signal for the system as a whole.

Neurological Interactions

Of all the organs in the body, the heart has the most extensive neural connection with the brain. Until relatively recently, much attention in biology has been focused on understanding how the brain regulates all organs in the body, including the heart. However, as discussed above, more recent understandings have begun to portray quite a different picture, in which the heart actually exerts a significant influence on the brain. In this section we describe the various ways in which the heart affects the brain and body via neurological pathways, and we examine in particular its influence on the activity and function of higher brain centers and processes. In order to understand this heart–brain relationship, it is necessary, first, to review some recent findings of how the brain processes information and how the organization of neurological activity is critical to brain function. This organization can be described in terms of the three concepts of coherence introduced at the beginning of this article: coherence as global order, as autocohereance, and as cross-coherence.

Coherence Within the Brain

The brain is often analogized to the functions of a computer. But in terms of information processing and computation the brain is nothing like a digital computer. It does not assemble thoughts and feelings from digitized bits of serial data. Rather, the brain is more like an analog processor that relates whole patterns and concepts to one another; it looks for similarities, differences, or relationships between them. The brain is a highly efficient processor and analyzer of information that is exquisitely sensitive to novelty—to rate of change and to the difference between patterns.

At the macro-level of organization, global coherence must be present in order for the brain and nervous system to function efficiently and effectively. This means that the neural activity, which encodes information, must be stable and coordinated. It also means that the various centers within the brain must be able to dynamically synchronize their activity in order for information to be smoothly processed and perceived.

For example, autocohereance and cross-coherence in the electrical activity of diverse regions of the brain are necessary for sensory perception to occur. Our “coherent” perception of an object in the external world actually comes from millions of units of fragmented sensory information that are made globally coherent by being brought together and organized into a single conscious experience.

A depiction of such macro-scale organization of neural activity is offered by studies using the electroencephalogram (EEG), which measures macro-scale activity occurring in the dendritic fields of the neurons. These fields reflect excitatory or inhibitory synaptic action over a large number of neurons. (A single scalp electrode provides estimates of synaptic action averaged over tissue masses containing between 10 million and 1 billion neurons.) There is a voluminous literature concerning the relations between the different brain rhythms found in the EEG and the many different aspects of cognition.¹³ For example, the alpha rhythm amplitude is lower during mental calculations while the beta rhythms increase (Nunez, 2000).

Recent research has focused on the global organization of cooperative workings of local and regional cell groups in order to better understand the brain's dynamic complexity. At an operational level, coherence in this context is a specific quantitative measure of functional relations between paired locations. In general, this research has shown that separate regions in the brain can exhibit high coherence in specific frequency bands and, at the same time, low coherence in other bands. The resulting correlated activity between these brain regions is cross-coherence, which is thought to emerge either from direct neural connections between the regions, common input from the thalamus and other neocortical regions, or both (Nunez, 2000). However, cross-coherence also occurs between distant cortical structures that are not necessarily interconnected anatomically (Bressler, Coppola, & Nakamura, 1993). This raises the question of what other mechanisms might account for this communication among distant brain regions.

A notable example of such cross-coherence has been described by Rodolfo Llinas, Chief of Physiology and Neuroscience at the New York University School of Medicine. He observed that specific areas of the cortex emit a steady oscillation, at a frequency of around 40 cycles per second (40 Hz). He also found that remote areas of the cortex were phase-locked at this 40-Hz frequency, meaning that the waves they produced all oscillated in synchrony. This led Llinas and others to suggest that the neurons perform in synchrony because they follow a kind of conductor (Ratey, 2001).

The prime candidate for the brain's internal conductor is the many intralaminar nuclei, located within the thalamus. These nuclei receive and project long axons to many areas of the brain. They take in information, reply to it, and monitor the responses to their replies, thus creating elaborate feedback loops in which resonant activity (~40 Hz) is modified by incoming sensory input. If the intralaminar nuclei are damaged, the person enters a deep and irreversible coma. Indeed, it appears that it is only when the "conductor" synchronizes the brain's activity that we become conscious. When this happens with a sufficient number of neural networks, the oscillations become ordered and globally coherent. As they spread their influence, recruiting more networks to join them, consciousness arises (Ratey, 2001).

The thalamus appears to play an active role in the generation of all the global EEG rhythms, and it should be emphasized that phase synchrony has been shown to occur in all the frequency

¹³ The main rhythms that have been identified are: the delta rhythm (0–4 Hz), the theta rhythm (4–8 Hz), the alpha rhythm (8–12 Hz), the beta rhythm (12–16 Hz), and most recently the gamma rhythm (~ 40 Hz).

bands found in the EEG, not just in the 40 Hz band.¹⁴ For example, different types of synchronization occur in the alpha band during the different phases of memory processes (encoding and retrieval) (Fingelkurts, Krause, Kaplan, Borisov, & Sams, 2003), and cross-coherence increases in the theta band during mental calculations (Nunez, 2000). Coherence in the alpha band is also correlated to perceptual and decision-making processes, and it increases in the frontal cortex during task processing (Kolev, Yordanova, Schurmann, & Basar, 2001).

The organization of the many interconnected neural networks within the brain allows for maximal flexibility in adapting to changing demands, such as focus on an external sensory input or an internal process. However, the degree of coupling, which regulates synchronized activity in the network, varies depending on the needs of the moment. When the network is either excessively coupled or is too loosely coupled, the system is less able to dynamically recruit the appropriate neural support systems it needs to respond to a particular demand. For example, the alpha rhythm increases in amplitude and distribution when the neural populations in the brain are more tightly coupled, which occurs when the brain regions involved are not processing information. Under these circumstances cognitive performance is reduced, especially that involving the processing of external sensory information. In terms of optimizing performance, this means in general that one should not be too relaxed (increased coupling) or overly stimulated (decreased coupling). Thus, in the light of the results of our studies of cognitive performance and heart-brain synchronization discussed above, the psychophysiological coherence mode appears to be a condition under which optimal coupling, and thus improved performance, occurs across diverse systems in the body.

Relevant to this discussion are the findings from a recent study of long-term Buddhist practitioners. This study found that while the practitioners generated a state of “unconditional loving-kindness and compassion,” increases in gamma band oscillation and long-distance phase synchrony were observed (Lutz, Greischar, Rawlings, Ricard, & Davidson, 2004). The study’s authors suggest that the large increase in gamma band synchrony reflects a change in the quality of moment-to-moment awareness. Moreover, because the characteristic patterns of *baseline* activity in these long-term meditators were found to be different from those of a control group, the results suggest that an individual’s baseline state can also be altered with long-term practice.

The authors of this study describe the Buddhist meditation as an “objectless meditation” in which the practitioners do not directly attend to a specific object or the breath, but focus instead on cultivating a feeling of “unconditional loving-kindness and compassion.” In many ways, the focus of this practice is comparable to the focus of the Heart Lock-In technique of the HeartMath system. It would therefore be interesting to investigate whether HeartMath practitioners, when in a state of psychophysiological coherence, also produce the increases in gamma-band oscillation

¹⁴The electroencephalogram (EEG) provides a very large-scale measure of the activity occurring in the dendritic fields of the neurons. These fields reflect the excess of excitatory or inhibitory synaptic action over a large number of neurons. A single scalp electrode provides estimates of synaptic action averaged over tissue masses containing between 10 million and 1 billion neurons. Synchronizations of oscillatory neural discharges are thought to play a crucial role in the constitution of transient networks that integrate distributed neural processes into highly ordered cognitive and affective functions that can induce synaptic changes.

and long-distance phase-synchrony observed in this study. Although this study did not measure heart rhythm coherence, another study of Buddhist monks using the same meditative focus of “loving-kindness and compassion” found an increase in heart rhythm coherence during this practice (Rapgay, n.d.). Because these studies were both conducted with samples of Buddhist monks who were practicing the same meditative focus, this raises the possibility that heart rhythm coherence and increased gamma-band phase synchrony are linked in a deeper way. This is consistent with the hypothesis that heart rhythm coherence reflects a state of increased global coherence in the body’s function as a whole.

In summary, the mechanisms that underlie the source of oscillatory rhythms in the thalamus are complex, and there are a number of different hypotheses concerning these. The mechanisms responsible for the synchronization of remote cells in the brain are even more complex, as there are both local and global levels of synchronization and also interactions between the local and global levels. Whatever the mechanisms turn out to be that facilitate synchronous activity in remote cell assemblies, it is clear that the *input from the heart* to the brain affects the activity of the thalamus and its ability to synchronize cortical activity. This is important in understanding the relationship between global coherence, emotional stability, and optimal performance.

More Than a Pump

Over the past several decades, several lines of scientific evidence have established that, far more than a mechanical pump, the heart functions as a sensory organ and as a complex information encoding and processing center. Groundbreaking research in the relatively new field of neurocardiology has demonstrated that the heart has an extensive intrinsic nervous system that is sufficiently sophisticated to qualify as a “little brain” in its own right. Pioneer neurocardiology researcher Dr. J. Andrew Armour first described the anatomical organization and function of the heart brain in 1991 (Armour, 1991). Containing over 40,000 neurons, its complex circuitry enables it to sense, regulate, and remember. Moreover, the heart brain can process information and make decisions about cardiac control independent of the central nervous system (Armour, 2003; Armour & Kember, 2004).

The heart brain senses hormonal, heart rate, and blood pressure signals, translates them into neurological impulses, and processes this information internally. It then sends the information to the central brain via afferent pathways in the vagus nerves and spinal column. When different hormones or neurotransmitters in the bloodstream are detected by the sensory neurites in the heart, the pattern in the afferent neural output sent to the brain is modified (Armour, 1994). In other words, in addition to its better-known functions, the heart is also a sensory center that detects and transmits information about the biochemical content of the regional blood flow.

Neurological signals originating in the heart have an important and widespread influence in regulating the function of organs and systems throughout the body. For example, it is now known that in addition to modulating the activity of the nervous and endocrine systems, input from the heart influences the activity of the digestive tract, urinary bladder, spleen, respiratory and lymph systems, and skeletal muscles (Chernigovskiy, 1967). In more specific terms, cardiovascular afferent signals regulate efferent ANS outflow, (Grossman, Janssen, & Vaitl, 1986) modulate pain perception (Randich & Gebhart, 1992) and hormone production (Drinkhill

& Mary, 1989), and influence the activity of the locus coeruleus and that of the pyramidal tract cells in the motor cortex (Coleridge et al., 1976; Svensson & Thoren, 1979). Also, spinal cord excitability varies directly with the cardiac pulse, as does physiological tremor of normal skeletal muscles (Forster & Stone, 1976).

Beyond the key role of cardiac afferent signals in physiological regulation, our earlier discussion also illuminates the heart's significant influence on perceptual and cognitive function via its input to higher brain centers. Our discussion has thus far covered behavioral data showing a relationship between the heart's input and cognitive performance, as well as electrophysiological studies demonstrating the synchronization of brain activity to the heart. Beyond these findings, there is also a considerable body of other electrophysiological evidence demonstrating the modulation of higher brain activity by cardiovascular afferent input (see Lacey & Lacey, 1970; McCraty, 2003; and Sandman et al., 1982, for reviews).

Experiments carried out in Germany by psychophysicologist Rainer Schandry have demonstrated that afferent input from the heart evokes cortical responses analogous to "classical" sensory event-related potentials. These experiments have shown that afferent input from the cardiovascular system is accompanied by specific changes in the brain's electrical activity. Schandry and colleagues found, as have we, that this activity is most pronounced at the frontocortical areas, a region particularly involved in the processing of visceral afferent information. In addition, psychological factors such as attention to cardiac sensations, perceptual sensitivity, and motivation have been found to modulate cortical heartbeat evoked potentials in a fashion analogous to the cortical processing of external stimuli (Lader & Mathews, 1970; Montoya, Schandry, & Muller, 1993; Schandry & Montoya, 1996; Schandry, Sparrer, & Weitkunat, 1986). In our own study, in which we investigated the electrophysiology of information processing in relation to intuition, we also found that the heart's afferent input significantly modulates frontocortical activity, especially during the psychophysiological coherence mode (McCraty et al., 2004a, 2004b).

The observation that the heart's afferent input modulates frontal activity is concordant with other findings that activity in the prefrontal cortex covaries with changes in the heart rhythm (Lane et al., 2001). This is consistent with the biological principle of reciprocal connections in neural systems. Therefore, in addition to the well-established routes (e.g., the thalamic pathway) by which cardiovascular afferent signals modulate higher cortical function, there may well be additional routes from the heart to the prefrontal cortex.

Biochemical Interactions

In addition to its extensive neurological interactions with the brain and body, the heart also communicates with the brain and body biochemically, by way of the hormones it produces. Although not typically thought of as an endocrine gland, the heart in fact manufactures and secretes a number of hormones and neurotransmitters that have a wide-ranging impact on body as a whole.

The heart was reclassified as part of the hormonal system in 1983, when a new hormone produced and secreted by the atria of the heart was discovered. This hormone has been variously

termed atrial natriuretic factor (ANF), atrial natriuretic peptide (ANP), or atrial peptide. Nicknamed the “balance hormone,” and playing an important role in fluid and electrolyte homeostasis, it exerts its effects on the blood vessels, kidneys, adrenal glands, and many of the regulatory regions of the brain (Cantin & Genest, 1985, 1986). In addition, studies indicate that atrial peptide inhibits the release of stress hormones (Strohle, Kellner, Holsboer, & Wiedemann, 1998), reduces sympathetic outflow (Butler, Senn, & Floras, 1994), plays a part in hormonal pathways that stimulate the function and growth of reproductive organs (Kentsch, Lawrenz, Ball, Gerzer, & Muller-Esch, 1992), and may even interact with the immune system (Vollmar, Lang, Hanze, & Schulz, 1990). Even more intriguing, experiments suggest that atrial peptide can influence motivation and behavior (Telegdy, 1994).

Several years following the discovery of atrial peptide, a related peptide hormone with similar biological functions was identified. This was called brain natriuretic peptide (BNP) because it was first identified in porcine brain. It soon became clear, however, that the main source of this peptide was the cardiac ventricle rather than the brain, and brain natriuretic peptide is now sometimes called B-type natriuretic peptide (Mukoyama et al., 1991).

Armour and colleagues also found that the heart contains a cell type known as intrinsic cardiac adrenergic cells. These cells are so classified because they synthesize and release catecholamines (norepinephrine, epinephrine, and dopamine), neurotransmitters once thought to be produced only by neurons in the brain and ganglia outside the heart (Huang et al., 1996). More recently still, it was discovered that the heart also manufactures and secretes oxytocin, commonly referred to as the “love” or social “bonding hormone.” Beyond its well-known functions in childbirth and lactation, recent evidence indicates that this hormone is also involved in cognition, tolerance, trust, complex sexual and maternal behaviors, as well as in the learning of social cues and the establishment of enduring pair bonds. Remarkably, concentrations of oxytocin produced in the heart are in the same range as those produced in the brain (Gutkowska et al., 2000).

In a preliminary study (10 participants), we examined changes in the blood concentrations of oxytocin and atrial peptide before and after 10 minutes of maintaining the psychophysiological coherence mode, which was generated by a loving emotional focus. While an increase in oxytocin was observed for the whole sample, it was not statistically significant, although it likely would have been with a larger sample. On the other hand, despite the small number of cases, the decrease in atrial peptide was significant. As atrial peptide release is an index of the stretch and contractile force of the atrial wall of the heart, these data suggest that cardiovascular efficiency increases during the psychophysiological coherence mode. The results for the male and female subgroups in this study are shown in Figure 6.

Heart Hormones Before and After Coherence

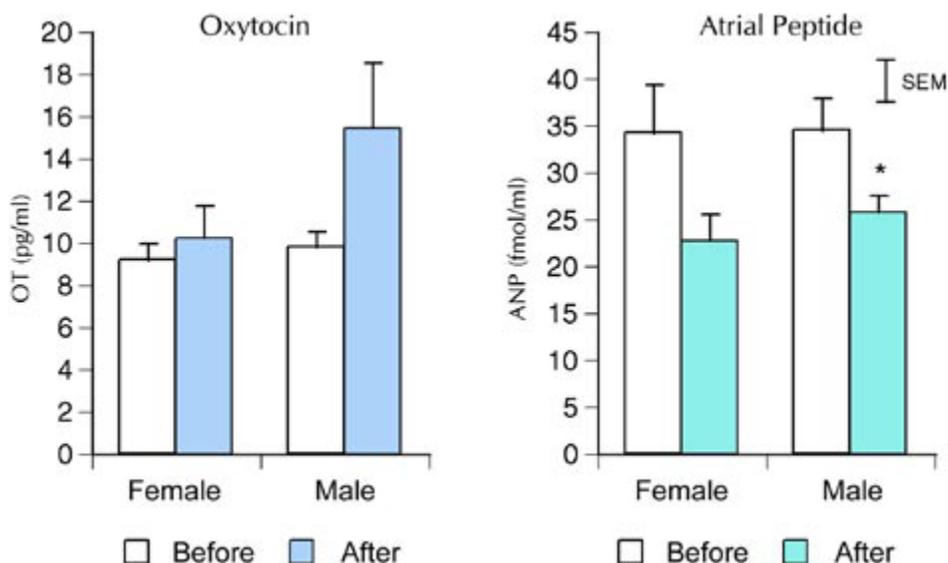


Figure 6. Oxytocin and atrial peptide changes during heart rhythm coherence. Graphs show changes in blood levels of oxytocin and atrial peptide for male and female subgroups from a resting baseline mode to after maintaining the coherence mode for 10 minutes.

In addition to changes in the *amount* of a heart hormone released into the blood affecting cellular and psychological systems, there is also evidence that the temporal *pattern* of the hormonal release has substantial effects independent of the amount of the hormone released. It has been known for some time that neurotransmitters, hormones, and intracellular “second messengers” are released in a pulsatile fashion. Pulsatile patterns of secretion are observed for nearly all of the major hormones, including ACTH, GH, LH, FSH, TSH, prolactin, beta-endorphin, melatonin, vasopressin, progesterone, testosterone, insulin, glucagon, renin, aldosterone, and cortisol, among many others.

Recent studies by German endocrinology researchers Georg Brabant, Klaus Prank, and Christoph Schofl have shown that, in much the same way that the nervous system encodes information in the time interval between action potentials, biologically relevant information is also encoded in the *temporal pattern* of hormonal release, across time scales ranging from seconds to hours (Schofl, Prank, & Brabant, 1995). As most heart hormones are released in synchronicity with the contractions of the heart, there is a rhythmic pattern of hormonal release that tracks the heart rhythm.

This is particularly relevant to our discussion of coherence, as it suggests that changes in heart rhythm patterns—such as those generated during psychophysiological coherence—impact the brain and body in yet another way: that is, they change the pattern of hormonal pulses released by the heart. Although the influence of these changes in hormonal pulse patterns on biological, emotional, and behavioral processes is still unknown, it is likely that the transmission of such hormonal information constitutes another pathway by which the effects of psychophysiological coherence on health, well-being, and performance are mediated.

Biophysical Interactions

With every beat, the heart generates a powerful pressure wave that travels rapidly throughout the arteries, much faster than the actual flow of blood. These waves of pressure create what we feel as our pulse. The heart sounds, generated by the closing of the heart valves and cardiac murmurs, can be heard all over the chest and can extend as far as the groin. Similarly, the pressure waves traveling through the arteries and tissues can affect every organ in the body, especially when the mechanisms that control blood pressure are compromised. In fact, the physical shock wave generated by the heartbeat expands the chest wall to such an extent that the heartbeat can be detected by measuring the chest expansion (this is called the ballistocardiogram).

Important rhythms also exist in the oscillations of blood pressure waves. In healthy individuals, a complex resonance occurs between blood pressure waves, respiration, and rhythms in the ANS. Because pressure wave patterns vary with the rhythmic activity of the heart, they represent yet another language through which the heart can communicate with the rest of the body. In essence, all of our cells sense the pressure waves generated by the heart and are dependent upon them in more than one way. At the most basic level, pressure waves force the blood cells through the capillaries to provide oxygen and nutrients to the cells. In addition, these waves expand the arteries, causing them to generate a relatively large electrical voltage. The waves also apply pressure to the cells in a rhythmic fashion, causing some of the proteins contained therein to generate an electrical current in response to the “squeeze.”

Experiments conducted in our laboratory have shown that a change in the brain’s electrical activity can be seen when the blood pressure wave reaches the brain, around 240 milliseconds after the contraction of the heart. An example is shown in Figure 7.

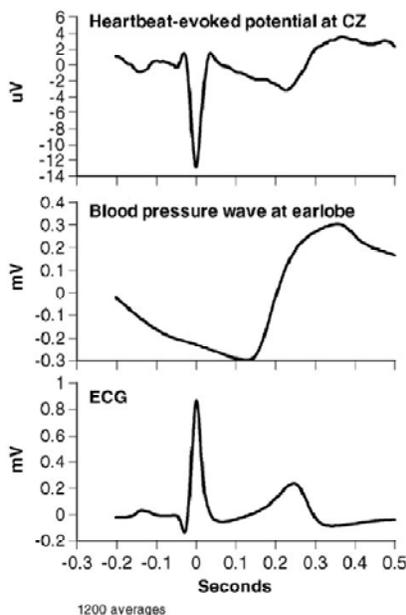


Figure 7. Evoked potentials in the EEG due to effects of the blood pressure wave. The top trace is the EEG recorded at the Cz location, and the middle trace is the blood pressure wave,

detected at the earlobe. Note that the blood pressure wave arrives at the brain around 240 milliseconds after the heartbeat, and a positive shift in the evoked potential in the EEG can be clearly seen upon its arrival.

We hypothesize that, in a similar manner to the encoding of information in the space between nerve impulses and in the intervals between bursts of hormonal activity, information is also contained in the interbeat intervals of the pressure waves produced by the heart. Given that these pressure waves can modulate brain activity and affect vital processes even down to the activity of biomolecules at the cellular level, this represents yet another, potentially important pathway by which information contained in changing heart rhythm patterns orchestrates system-wide effects.

Energetic Interactions

Thus far we have discussed the role of the heart in information processing and communication in terms of neurological, hormonal, and biophysical interactions. In this section we explore how the heart also communicates information to the brain and throughout the body via electromagnetic field interactions.

To understand how communication occurs via these biological fields requires an *energetic* concept of information—one in which data about *patterns* of organization are actually enfolded into the waves of energy generated by the body's activity and distributed throughout the body's electromagnetic field. This concept is quite different from the "lock and key" concept of biochemical interactions, in which communication occurs through the action of biochemicals, such as neurotransmitters, fitting into specialized receptor sites, much like keys open certain locks (McCraty et al., 1998). To explain how energetic communication occurs in biological systems, we take Pribram's holographic approach. He believes, as we do, that the communication of energetic information in biological systems is best understood in the terms of the information processing principles of holographic theory (McCraty et al., 1998; Pribram, 1991; Pribram & Bradley, 1998).

Of all the organs, the heart generates by far the most powerful and most extensive rhythmic electromagnetic field produced in the body. When electrodes placed on the surface of the body are used to measure the ECG, it is the electrical component of the heart's field that is detected and measured. This electrical voltage, about 60 times greater in amplitude than the electrical activity produced by the brain, permeates every cell in the body. Thus, the ECG can be detected by placing electrodes anywhere on the body, from the little toe to the top of the head. The magnetic component of the heart's field, which is approximately 5,000 times stronger than the magnetic field produced by the brain (Russek & Schwartz, 1996), is not impeded by the body's tissues and easily radiates outside of the body. This field can be measured several feet away from the body with sensitive magnetometers (McCraty et al., 1998). These energetic emanations and interactions provide a plausible mechanism for how we can "feel" or sense another person's presence and even their emotional state, independent of body language and other signals (McCraty, 2004).

The heart's ever-present rhythmic field has a powerful influence on communicative processes throughout the body. As already noted above, brain rhythms naturally synchronize to the heart's rhythmic activity, and the rhythms of diverse physiological oscillatory systems can entrain to the heart's rhythm. There is evidence that the heart's field may even play a regulatory role at the cellular level, in that we have found that changes in the cardiac field can affect the growth rate of cells in culture (McCraty et al., 1998).

As can be seen in Figure 20, (Appendix D) the electromagnetic waves generated by the heart are immediately registered in one's brain waves and can have quite a large effect on the heartbeat evoked potential. This same effect has been observed by Gary Schwartz and colleagues at the University of Arizona, who also suggest that energetic interactions between the heart and brain play an important role in psychophysiological processes (Russek & Schwartz, 1994, 1996; Song, Schwartz, & Russek, 1998).

Energetic Signatures of Psychophysiological Modes

Our research has shown that information about a person's emotional state is also communicated throughout the body and into the external environment via the heart's electromagnetic field (McCraty et al., 1998). As described earlier, the rhythmic beating patterns of the heart change significantly as we experience different emotions. Thus, negative emotions, such as anger or frustration, are associated with an erratic, *incoherent* pattern in the heart's rhythms, whereas positive emotions, such as love or appreciation, are associated with a sine-wave-like pattern, denoting *coherence* in the heart's rhythmic activity. In turn, these changes in the heart's beating patterns create corresponding changes in the frequency spectra of the electromagnetic field radiated by the heart.

This is observed when spectral analysis techniques are applied to the energy waveforms generated by the heart (ECG or MCG) in the same way that is typically done when analyzing waves generated by electrical activity in the brain. Different spectral patterns are correlated both with the patterns of beat-to-beat variability and with the current psychophysiological state. These spectral patterns can be interpreted as "information patterns" containing data about the psychophysiological state of the individual in that moment in time. Appendix E shows waterfall plots from the ECG data used to produce the examples of the six different psychophysiological modes described at the outset of this article. These reveal distinctive spectral patterns associated with each specific mode.

The Holographic Heart

The spectra of ECG recordings in Appendix E illustrate the enormous richness and complexity of the heart's activity and the voluminous density of information encoding and transmission that occurs, via the movement of energy, in the body's internal electromagnetic environment. As already noted, similar patterns of information are encoded in the space (time) between nerve impulses and in the intervals between bursts of hormonal activity and pressure waves. We propose, further, that information is encoded and communicated in same manner *in the intervals between heartbeats*. Such an information encoding strategy would allow communication via the neural and hormonal pulses that are produced with each heartbeat and

also via the electromagnetic waves produced by the heart. As a means by which the heart can transmit information both throughout the body's psychophysiological networks and into the external environment, the validity of this energetic communication mechanism can be empirically verified. This concept of energetic communication provides the basis for explaining how information about the organization and state of the system as a whole is distributed throughout the body in an almost instantaneous way.

The heart's rhythmic energetic activity lies at the center of our account. The heart generates a continuous series of electromagnetic pulses in which the time interval between pulses varies in a dynamic and complex manner. These pulsing waves of electromagnetic energy give rise to fields within fields, which form interference patterns when they interact with magnetically polarizable tissues and structures. In more specific terms, we postulate that as pulsing waves of energy radiate out from the heart, the energy waves interact with organs and other structures to create interference patterns. At the same time, the endogenous processes in each of the other organs, structures, and systems, including those at the micro-scale of cells and membranes, also generate patterns of dynamic activity. These patterns of dynamic activity radiate out into the body's internal environment as energy oscillations, and they interact with the energy waves from the heart and to some degree with the energy waves of other organs and structures. In each of these interactions the energy waves encode the features of the objects and their dynamic activity as interference patterns. Because the heart generates by far the strongest energy field, which interacts with both the macro and micro scales of the body's organization, the waves it produces operate effectively as global carrier waves that encode the information contained in the interference patterns. These global carrier waves thus contain encoded information from *all* of the body's energetic interactions, and they distribute this information throughout all systems in the body. In this holographic-like process, the encoded information acts to *in-form* the activity of all bodily functions (McCraty et al., 1998). This energetic communication system thereby operates as a global organizing mechanism to coordinate and synchronize psychophysiological processes in the body as a whole.

This theory—that the heart encodes and distributes energetic information holographically—is based on the same model that neuropsychologist Karl Pribram has used to describe the neural processes in the brain that gives rise to perception and memory (Pribram, 1971, 1991). In this model, as Pribram makes clear, the neural impulses are only relaying information from one part of the brain to another. However, the actual processing of information occurs in the spectral domain of energy frequency—a domain outside space and time in which the waves of energy produced by the operation of the neural microstructure interact. Moreover, he has shown that that the same mathematics that Gabor (1948) used to describe the quantum-holographic principles involved in the physics of signal processing can also be used to describe the information processing that occurs in the electromagnetic interactions between the dendritic and axon fields of neurons (McCraty et al., 1998). While a discussion of this is beyond the scope of this article, Pribram and other brain scientists have presented a large body of compelling experimental evidence that supports the veracity of Pribram's bioenergetic model of information processing (King, Xie, Zheng, & Pribram, 1994; McCraty et al., 1998; Pribram, 1971, 1991; Santa Maria et al., 1995). Thus, in addition to the energetic information processing that occurs in the brain, as described by Pribram, we propose that there is also a heart-based global energetic system that encodes and distributes information to coordinate and organize the function of the body as a

whole.¹⁵ Thus, in addition to the energetic information processing that occurs in the brain, as described by Pribram, we propose that there is also a heart-based global energetic system that encodes and distributes information to coordinate and organize the function of the body as a whole.

There is compelling evidence to suggest that the heart's energy field is coupled to a field of information that is not bound by the limits of time and space. This evidence comes from a rigorous experimental study we conducted to investigate the proposition that the body receives and processes information about a future event before the event actually happens (McCraty et al., 2004a, 2004b). The study's results provide surprising, even astounding data showing that both the heart and brain appear to receive and respond to information about a future event. Even more tantalizing is the evidence that the heart appears to receive intuitive information *before* the brain. This suggests that the heart is directly coupled to a subtle energetic field of ambient information that surrounds the body, which, in turn, is entangled and interacts with the multiplicity of energy fields in which the body is embedded—including that of the quantum vacuum.

In short, it would appear that we are only just beginning to understand the fundamental role of a bioenergetic communication system in processing information from sources both within and outside the body to *in-form* physiological function, cognitive processes, emotions, and behavior. In this system, it thus seems clear that the energy field of the heart plays a crucial role.

Conclusion

The origin of feelings is the body in a certain number of its parts. But now we can go deeper and discover a finer origin underneath that level of description. . .

(Damasio, 2003, p. 132)

Damasio sums up the current understanding held by many of today's scientists of the genesis of feelings and emotions. This is the notion that the origin of the particular emotional feelings we experience in each moment lies in the substrata of our body's physiological processes. Positive feelings emerge from body states in which the physiological regulation of the processes of life is easy and free-flowing, while negative feelings reflect the strain of life processes that are difficult for the body to balance and that may even be out of control. This general understanding has roots in an earlier era in psychology and has recently reemerged in the scientific study of emotion. However, the geography of this realm is largely uncharted and has only just begun to be mapped. Needless to say, a more complete understanding awaits development. In this article we have thus endeavored to "go deeper" by offering an account of the "finer origin" of the psychophysiological processes involved in emotional experience.

In "going deeper," we based our approach on the premise that the body's physiological, cognitive, and emotional systems are intimately intertwined through ongoing processes involving reciprocal communication. We hold that an understanding of the workings of these systems must view their activity as emergent from the dynamic, communicative network of interacting

¹⁵ See also the Appalachian Conferences volumes.

functions that comprise the human organism. To describe these communicative processes we adopted an information processing perspective. From this viewpoint, communication within and among the body's systems is seen to occur through the generation and transmission of *rhythms and patterns* of psychophysiological activity. This focus stands in contrast to the traditional approach, in which the amount of physiological activity is viewed as the primary basis of communication. We believe a focus on rhythms and patterns of psychophysiological activity illuminates a more fundamental order of information communication—one that signifies different emotional states, operates to integrate and coordinate the body's functioning as a whole, and also links the body to the processes of the external world.

In order to understand the functional significance of the morphology of patterns of physiological activity, we drew on the concept of coherence from the physics of signal processing. This is the notion that the degree of efficiency and effectiveness of a system's functioning is directly related to the degree to which there is a harmonious organization of the interaction among the elements of the system. Thus, a harmonious order in the rhythm or pattern of activity signifies a coherent system, whose efficient or optimal function is directly related, in Damasio's terms, to the "fluidity" of life processes. By contrast, an erratic, nonharmonious pattern of activity marks an incoherent system, whose function reflects the "strain" of life processes.

In operationalizing this approach, we used the pattern of the heart's rhythmic activity as our primary physiological marker, as it was the most sensitive measure of changes in emotional states. In reviewing the results of our empirical research, we identified six psychophysiological modes distinguished by their physiological, mental, and emotional correlates. These are: Mental Focus, Psychophysiological Incoherence, Psychophysiological Coherence, Relaxation, Extreme Negative Emotion, and Emotional Quiescence. We showed that different emotions are associated with different degrees of coherence in the activity of the body's systems. While positive emotions such as appreciation, care, and love drive the system toward increased physiological coherence, negative emotions drive the system towards incoherence.

In particular, we highlighted the importance of the psychophysiological coherence mode. Associated with the experience of sustained positive emotions, the coherence mode has numerous psychological and health-related benefits, which have been demonstrated by a growing body of research. Of note are the findings showing a direct relationship between this mode and cognitive performance, as well as data linking this mode to intuition.

Using our empirical findings as a point of departure, we constructed a typology—a conceptual "map"—of the reality of psychophysiological interaction. We differentiated twelve primary types of psychophysiological interaction, distinguished by their values on two theoretical dimensions. Each type describes a distinctive physiological substratum that underlies a different primary emotion or psychophysiological state. Six of the types signify emotional states typically experienced in the course of everyday life. Qualitatively distinct from the feelings of everyday life are six additional types of psychophysiological interaction. Discontinuous from the psychophysiological states of day-to-day life, these are hyper-states of extreme emotions reflecting the body's response to extraordinary circumstances. One interesting implication of the

typology is the prediction of four additional hyper-states of psychophysiological interaction, beyond the two hyper-states that we have been able to document empirically.

While our findings on the psychophysiological modes showed that the patterns of the heart's rhythmic activity are clearly *reflective* of different emotional states, in the second part of this article we also presented an account of the heart's constructive role in the physiological processes by which emotional experience is *generated*. According to a model based on Pribram's theory, emotions result from the "mismatch" between familiar input patterns and current input patterns that are different or novel. The heart is the primary source of dynamic rhythmic patterns in the body and possesses extensive communication networks with the brain and other systems. With each beat, it not only pumps blood, but also transmits patterns of neurological, hormonal, pressure, and electromagnetic information through these networks. These multiple inputs to the brain from the heart contribute significantly to the familiar reference pattern and also to those deviations from the familiar that are experienced as changes in emotions.

We also presented evidence showing that the heart has a significant influence on the brain's neurological activity and even plays a role in modulating cognitive functions. While extensive evidence had previously established that sensory-motor integration and cognitive processing is modified by changes in heart rate (beat-to-beat cardiac accelerations and decelerations), our research has expanded this understanding. We found that macro-scale patterns of the heart's rhythmic activity also significantly affect cognitive performance and intentional behavior well beyond the micro-scale effects previously reported. We also demonstrated a significant relationship between heart rhythm patterns and cognitive performance, in that increased heart rhythm coherence leads to improved cognitive performance.

This along with other findings led us to propose that a global level of organization serves to bind and synchronize the body as a whole. In this function we believe that the heart is a key organ in orchestrating activity across multiple systems, encompassing both micro and macro levels of organization. We proposed that information is encoded in the interbeat intervals of the waveforms of neurological, hormonal, pressure, and electromagnetic activity generated by the heart. Because of the heart's wide-ranging linkage to the body's major systems, information encoded in the heart's rhythmic patterns both reflects and influences the ongoing dynamics of the body as a whole. Furthermore, when the heart's rhythmic activity shifts into coherence, synchronization and harmonious interaction within and among systems is the result. This, in turn, produces optimal states of health, physical activity, and cognitive performance. Thus, the heart is a critical nodal point in the psychophysiological network: it acts as the conductor in the human symphony, setting the beat that binds and synchronizes the entire system.

An important, though little investigated, way in which the heart acts as a global conductor is through its electromagnetic interactions. We proposed that the electromagnetic fields produced by the heart form a complex energetic network that connects the electromagnetic fields of the rest of the body. In doing so, the heart's energetic field acts as a modulated carrier wave that encodes and communicates information throughout the entire body, from the systemic to the cellular levels, and even conveys information outside the body between individuals. In these ways it provides a global signal that integrates the order of the system as a whole.

The concept of an energetic information field is not a new one. Indeed, many prominent scientists have proposed models in which information from all physical, biological and psychosocial interactions is enfolded as a spectral order outside the space/time world in the energy waveforms of the quantum vacuum. Holographic principles (Gabor, 1948) form the basis of most of these theories and have been used to describe how information about the organization of a whole is nonlocalized—enfolded and distributed to all parts and locations via the energy waveforms produced by interactions in the brain, (Pribram, 1971, 1991) social structures, (Bradley, 1987; Bradley & Pribram, 1998) and the universe (Bekenstein, 2003; Nadeau & Kafatos, 1999). We adopted a holographic perspective to describe how energy waveforms generated by the heart's electromagnetic field encode and distribute information about all structures and processes throughout the body from the cellular level to the body as a whole. Moreover, the energy fields produced by the heart and other bodily structures are transmitted externally. And because these energy fields are in continuous interaction with the multiplicity of energy fields in the environment, it appears that information about nonlocal events and processes is conveyed back to the body and processed as intuition.

We believe that the concept of energetic information holds promise as a way of understanding how the body's bioenergetic communication system operates to process information from sources both within and outside the body. Based on the evidence we have presented, it seems clear that the energy field of the heart plays a crucial role in in-forming physiological function, cognitive processes, emotions, and behavior.

We have endeavored to present a deeper understanding of the central significance of the heart in virtually all aspects of the body's function. As a principal and consistent source of rhythmic information patterns that impact the physiological, cognitive, and emotional systems, the heart thus provides an access point from which a change in system-wide function can be immediately effected. When positive emotions are used to shift the heart's pattern of activity into coherence, a global transformation in psychophysiological function occurs. As the evidence we have presented clearly shows, this transformation results in increased physiological efficiency, greater emotional stability, and enhanced cognitive function and performance. As a simple and direct means by which one can shift into a state of psychophysiological coherence, the HeartMath tools are a highly effective method to facilitate this transformation. In the case of Chris, with which we opened this article, the use of these tools proved to be a life-saving and life-changing intervention, leading to changes not only in his physical health, but also in his emotional life, work performance, and relationships. We believe that the growing use of these and similar heart-based tools around the globe by educators and students, health care workers and patients, and managers and employees, among others, can play a significant part in improving the "life processes" of humankind.

References

- Adair, J., R., & Manning, J. W. (1975). Hypothalamic modulation of baroreceptor afferent unit activity. *American Journal of Physiology*, 229, 1357-1364.
- Ahern, G., L., & Schwartz, G. E. (1985). Differential lateralization for positive and negative emotion in the human brain EEG spectral analysis. *Neuropsychologia*, 23(6), 745-755.

- Arguelles, L., McCraty, R., & Rees, R. A. (2003). The heart in holistic education. *Encounter: Education for Meaning and Social Justice*, 16(3), 13-21.
- Armour, J. A. (1991). Anatomy and function of the intrathoracic neurons regulating the mammalian heart. In I. H. Zucker & J. P. Gilmore (Eds.), *Reflex control of the circulation* (pp. 1-37). Boca Raton, FL: CRC Press.
- Armour, J. A. (1994). Peripheral autonomic neuronal interactions in cardiac regulation. In J. A. Armour & J. L. Ardell (Eds.), *Neurocardiology* (pp. 219-244). New York, NY: Oxford University Press.
- Armour, J. A. (2003). *Neurocardiology—Anatomical and functional principles* (Publication No. 03-011). Boulder Creek, CA: HeartMath Research Center, Institute of HeartMath. Retrieved from: <http://store.heartmath.org/store/scientific-monographs/Tend-Report>.
- Armour, J., A., & Kember, G. C. (2004). Cardiac sensory neurons. In J. A. Armour & J. L. Ardell (Eds.), *Basic and clinical neurocardiology* (pp. 79-117). New York, NY: Oxford University Press.
- Andersen, P., & Andersson, S. A. (1968). *Physiological basis of the alpha rhythm*. New York, NY: Appleton-Century-Crofts.
- Ashby, W. R. (1956). *An introduction to cybernetics*. London: Chapman, & Hall.
- Barrios-Choplin, B., McCraty, R., & Cryer, B. (1997). An inner quality approach to reducing stress and improving physical and emotional wellbeing at work. *Stress Medicine*, 13(3), 193-201.
- Barrios-Choplin, B., McCraty, R., Sundram, J., & Atkinson, M. (1999). *The effect of employee self-management training on personal and organizational quality* (Publication No. 99-083). Boulder Creek, CA: HeartMath Research Center, Institute of HeartMath. Retrieved from <http://www.heartmath.org/research/rp-effect-of-employee-self-management-training-on-personal-and-organizational-quality.html>
- Baselli, G., Cerutti, S., Badilini, F., Biancardi, L., Porta, A., Pagani, M., . . . Malliani, A. (1994). Model for the assessment of heart period variability interactions of respiration influences. *Medical and Biological Engineering and Computing*, 32(2), 143-152.
- Baule, G., & McFee R. (1963). Detection of the magnetic field of the heart. *American Heart Journal*, 55 (7), 95-96.
- Bekenstein, J. D. (2003). Information in the holographic universe. *Scientific American*, 289 (2), 58-65.
- Bering, E. A. (1955). Choroid plexus and arterial pulsation of cerebrospinal fluid. *Archives of Neurology and Psychiatry*, 73, 165-172.
- Birbaumer, N. (1975). *Physiologische psychologie*. Berlin, Germany: Springer.
- Blakeslee, T., R., & Grossarth-Maticek, R. (1996). *Feelings of pleasure and well-being as predictors of health status 21 years later*. Retrieved from <http://www.attitudefactor.com/PWIttecharticle.htm>
- Bolte, A., Goschke, T., & Kuhl, J. (2003). Emotion and intuition: Effects of positive and negative mood on implicit judgments of semantic coherence. *Psychological Science*, 14 (5), 416-421.
- Bradford, E. J., Wesnes K. A., & Brett, D. (2005). Effects of peak performance training on cognitive function [Supplement]. *Journal of Psychopharmacology*, 19 (5), A44.
- Bradley, R. T. (1987). *Charisma and social structure: A study of love and power, wholeness and transformation*. New York, NY: Paragon House.

- Bradley, R. T. (2002). Dialogue, information, and psychosocial organization. In N. C. Roberts (Ed.), *Dialogue and transformation* (pp. 243-288). London: Elsevier Science.
- Bradley, R. T., & Pribram, K. H. (1998). Communication and stability in social collectives. *Journal of Social and Evolutionary Systems*, 21 (1), 29-80.
- Bressler, S. L., Coppola, R., & Nakamura, R. (1993). Episodic multiregional cortical coherence at multiple frequencies during visual task performance. *Nature*, 366 (6451), 153-156.
- Butler, G. C., Senn, B. L., & Floras, J. S. (1994). Influence of atrial natriuretic factor on heart rate variability in normal men. *American Journal of Physiology* 267 (2, Pt. 2), H500-H505.
- Callaway, E., III. (1962). Factors influencing the relationship between alpha activity and visual reaction time. *Electroencephalography and Clinical Neurophysiology*, 14, 674-682.
- Callaway, E., III, & Yeager, C. L. (1960). Relationship between reaction time and electroencephalographic alpha phase. *Science*, 132, 1765-1766.
- Cameron, O. G. (2002). *Visceral sensory neuroscience: Interoception*. New York, NY: Oxford University Press.
- Canli, T., Desmond, J. E., Zhao, Z., Glover, G., & Gabrieli, J. D. (1998). Hemispheric asymmetry for emotional stimuli detected with fMRI. *Neuroreport*. 9 (14), 3233-3239.
- Cantin, M., & Genest, J. (1985). The heart and the atrial natriuretic factor. *Endocrine Reviews*, 6 (2), 107-127.
- Cantin, M., & Genest, J. (1986). The heart as an endocrine gland. *Scientific American*, 254 (2), 76-81.
- Chernigovskiy, V. N. (1967) *Interoceptors*. Washington, DC: American Psychological Association.
- Childre, D., & Cryer, B. (2000). *From chaos to coherence: The power to change performance*. Boulder Creek, CA: Planetary.
- Childre, D., & Martin, H. (1999). *The HeartMath solution*. San Francisco: HarperSanFrancisco.
- Childre, D., & Rozman, D. (2002). *Overcoming emotional chaos: Eliminate anxiety, lift depression and create security in your life*. San Diego: Jodere Group.
- Childre, D., & Rozman, D. (2005). *Transforming stress: The HeartMath solution to relieving worry, fatigue, and tension*. Oakland, CA: New Harbinger Publications.
- Childre, D. L. (1991). *Heart Zones* [CD]. Boulder Creek, CA: Planetary Publications.
- Coleridge, H. M., Coleridge, J. C., & Rosenthal, F. (1976). Prolonged inactivation of cortical pyramidal tract neurons in cats by distention of the carotid sinus. *Journal of Physiology*, 256, 635-649.
- Damasio, A. (2003). *Looking for Spinoza: Joy, sorrow, and the feeling brain*. Orlando, FL: Mariner, 2003.
- Danner, D. D., Snowdon, D. A., & Friesen, W. V. (2001). Positive emotions in early life and longevity: Findings from the nun study. *Journal of Personality and Social Psychology*, 80 (5), 804-813.
- Davidson R. J. (1992). Anterior cerebral asymmetry and the nature of emotion. *Brain and Cognition*, 20 (1), 125-151.
- Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli S. F., . . . Sheridan, J. F. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine*, 65(4), 564-570.
- DeBoer, R. W., Karemaker, J. M., & Strackee, J. (1987). Hemodynamic fluctuations and baroreflex sensitivity in humans: A beat-to-beat model. *American Journal of Physiology*, 253 (3, Pt. 2), H680-H689.

- Drinkhill, M. J., & Mary, D. A. (1989). The effect of stimulation of the atrial receptors on plasma cortisol level in the dog. *Journal of Physiology*, *413*, 299-313.
- Dustman, R. E., & Beck, E. C. (1965). Phase of alpha brain waves, reaction time and visually evoked potentials. *Electroencephalography and Clinical Neurophysiology*, *18*, 433-440.
- Fingelkurts, A., Krause, C., Kaplan, A., Borisov, S., & Sams, M. (2003). Structural (operational) synchrony of EEG alpha activity during an auditory memory task. *Neuroimage*, *20* (1), 529-542.
- Foreman, R. (1997). Organization of visceral input. In T. L. Yaksh, Lynch, C. III, W. M. Zapol, M. Maze, J. F. Biebuyck, & L. J. Saidman (Eds.), *Anesthesia: Biologic Foundations* (pp. 663-683). Philadelphia: Lippincott-Raven Publishers.
- Foreman, R. D. (1989). Organization of the spinothalamic tract as a relay for cardiopulmonary sympathetic afferent fiber activity. *Progress in Sensory Physiology*, *9*, 1-51.
- Foreman, R. D. (1994). Vagal afferent modulation of cardiac pain. In M. N. Levey & P. J. Schwartz (Eds.), *Vagal control of the heart: Experimental basis and clinical implications* (pp. 345-368). Armonk, NY: Futura Publishing.
- Foster, A., & Stone, T. W. (1976). Evidence for a cardiovascular modulation of central neuronal activity in man. *Experimental Neurology*, *51*, 141-149.
- Fredrickson, B. L. (2002). Positive emotions. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 120-134). New York, NY: Oxford University Press.
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, *56* (3), 218-226.
- Fredrickson, B. L., & Branigan, C. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition and Emotion*, *19* (3), 313-332.
- Fredrickson, B. L., Manasco, R. A., Branigan, C., & Tugade, M. M. (2000). The undoing effect of positive emotions. *Motivation and Emotion*, *24*, 237-258.
- Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crises? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology*, *84* (2), 365-376.
- Friedman, B. H., & Thayer, J. F. (1998). Autonomic balance revisited: Panic anxiety and heart rate variability. *Journal of Psychosomatic Research*, *44* (1), 133-151.
- Frysinger, R. C., & Harper, R. M. (1990). Cardiac and respiratory correlations with unit discharge in epileptic human temporal lobe. *Epilepsia*, *31* (2), 162-171.
- Gabor, D. (1946). Theory of communication. *Journal of the Institute of Electrical Engineers*, *93*, 429-457.
- Gabor, D. (1948). A new microscopic principle. *Nature*, *161*, 777-778.
- Grossman, P., Janssen, K. H. L., & Vaitl, D. (Eds.). (1986). *Cardiorespiratory and cardiosomatic psychophysiology*. New York, NY: Plenum Press.
- Groves, D. A., & Brown, V. J. (2005). Vagal nerve stimulation: A review of its applications and potential mechanisms that mediate its clinical effects. *Neuroscience and Biobehavioral Reviews*, *29* (3), 493-500.
- Gutkowska, J., Jankowski, M., Mukaddam-Daher, S., & McCann, S. M. (2000). Oxytocin is a cardiovascular hormone. *Brazilian Journal of Medical and Biological Research*, *33*, 625-633.
- Hansen, A. L., Johnsen, B. H., & Thayer, J. F. (2003). Vagal influence on working memory and attention. *International Journal of Psychophysiology*, *48* (3), 263-274.

- Hassert, D. L., Miyashita, T., & Williams, C. L. (2004). The effects of peripheral vagal nerve stimulation at a memory-modulating intensity on norepinephrine output in the basolateral amygdala. *Behavioral Neuroscience*, *118* (1), 79-88.
- Hirsch, J. A., & Bishop, B. (1981). Respiratory sinus arrhythmia in humans: How breathing pattern modulates heart rate. *American Journal of Physiology*, *241* (4), H620-H629.
- Ho, M. W. (1998). *The rainbow and the worm: The physics of organisms*. London: World Scientific Publishing.
- Huang, M. H., Friend, D. S., Sunday, M. E., Singh, K., Haley, K., Austen, K. F., . . . Smith, T. W. (1996). An intrinsic adrenergic system in mammalian heart. *Journal of Clinical Investigation*, *98* (6), 1298-1303.
- Isen, A. M. (1998) On the relationship between affect and creative problem solving. In S. W. Russ (Ed.), *Affect, creative experience, and psychological adjustment* (pp. 3-17). Philadelphia: Brunner/Mazel.
- Isen, A. M. (1999). Positive affect. In T. Dalgleish & M. Power (Eds.), *Handbook of cognition and emotion* (pp. 522-539). New York, NY: John Wiley & Sons.
- James, W. (1884). What is an emotion? *Mind*, *9* (34), 188-205.
- Kennedy, J. L. (1959). A possible artifact in electroencephalography. *Psychological Review*, *66*, 347-352.
- Kentsch, M., Lawrenz, R., Ball, P., Gerzer, R., & Muller-Esch, G. (1992). Effects of atrial natriuretic factor on anterior pituitary hormone secretion in normal man. *The Clinical Investigator*, *70* (7), 549-555.
- King, J. S., Xie, M., Zheng, B., & Pribram, K. H. (1994). Spectral density maps of receptive fields in the rat's somatosensory cortex. In K. H. Pribram (Ed.). *Proceedings of the second Appalachian conference on behavioral neurodynamics: origins: Brain and self organization* (pp. 557-571). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kolev, V., Yordanova, J., Schurmann, M., & Basar, E. (2001). Increased frontal phase-locking of event-related alpha oscillations during task processing. *International Journal of Psychophysiology*, *39* (2-3), 159-165.
- Kosel, M., & Schlaepfer, T. E. (2003). Beyond the treatment of epilepsy: New applications of vagus nerve stimulation in psychiatry. *CNS Spectrums*, *8* (7), 515-521.
- Lacey, B. C., & Lacey, J. I. (1974). Studies of heart rate and other bodily processes in sensorimotor behavior. In P. A. Obrist, A. H. Black, J. Brener, & L. V. DiCara (Eds.), *Cardiovascular psychophysiology: Current issues in response mechanisms, biofeedback, and methodology* (pp. 538-564). Chicago: Aldine.
- Lacey, J. I. (1967). Somatic response patterning and stress: Some revisions of activation theory. In M. H. Appley & R. Trumbull (Eds.), *Psychological stress: Issues in research* (pp.14-42). New York, NY: Appleton-Century-Crofts.
- Lacey, B. C. & Lacey, J. I. (1964, October). *Cardiac deceleration and simple visual reaction in a fixed foreperiod experiment*. Paper presented at the meeting of the Society for Psychophysiological Research, Washington, D.C.
- Lacey, J. I., & Lacey, B. C. (1970). Some autonomic-central nervous system interrelationships. In P. Black (Ed.), *Physiological correlates of emotion* (pp. 205-227). New York, NY: Academic Press.
- Lader, M., & Mathews, A. (1970). Physiological changes during spontaneous panic attacks. *Journal of Psychosomatic Research*, *14* (4), 377-382.

- Lane, R. D, Reiman, E. M., Ahern, G. L., & Thayer, J. F. (2001). Activity in medial prefrontal cortex correlates with vagal component of heart rate variability during emotion. *Brain and Cognition*, 47, 97-100.
- Langhorst, P., Schulz, G., & Lambertz, M. (1984). Oscillating neuronal network of the "common brainstem system." In K. Miyakawa, H. P. Koepchen, & C. Polosa (Eds.), *Mechanisms of blood pressure waves* (pp. 257-275). Tokyo: Japan Scientific Societies Press.
- Langhorst, P., Schulz, G., & Lambertz, M. (1986). Integrative control mechanisms for cardiorespiratory and somatomotor functions in the reticular formation of the lower brain stem. In P. Grossman, K. H. L. Janssen, & D. Vaitl (Eds.), *Cardiorespiratory and cardiosomatic psychophysiology* (pp. 9-39). New York, NY: Plenum Press.
- Lansing, R. W. (1957). Relation of brain and tremor rhythms to visual reaction time. *Electroencephalography and Clinical Neurophysiology*, 9 (3), 497-504.
- Lehrer, P., Sasaki, Y., & Saito, Y. (1999). Zazen and cardiac variability. *Psychosomatic Medicine*, 61, 812-821.
- Lehrer, P., Smetankin, A., & Potapova, T. (2000). Respiratory sinus arrhythmia biofeedback therapy for asthma: A report of 20 unmedicated pediatric cases using the Smetankin method. *Applied Psychophysiology and Biofeedback*, 25 (3), 193-200.
- Lehrer, P. M, Vaschillo, E., Vaschillo, B., Lu, S. E., Eckberg, D. L., Edelberg, R., . . . Hamer, R. M. (2003). Heart rate variability biofeedback increases baroreflex gain and peak expiratory flow. *Psychosomatic Medicine*, 65 (5), 796-805.
- Lessmeier, T. J., Gamperling, D., Johnson-Liddon, V., Fromm, B. S., Steinman, R. T., Meissner, M. D, & Lehmann, M. H. (1997). Unrecognized paroxysmal supraventricular tachycardia: Potential for misdiagnosis as panic disorder. *Archives of Internal Medicine*, 157, 537-543.
- Lindsley, D. B. (1961) The reticular activating system and perceptual integration. In D. E. Sheer (Ed.). *Electrical stimulation of the brain* (pp. 331-349). Austin: University of Texas.
- Luskin, F., Reitz, M., Newell, K., Quinn, T. G., & Haskell, W. (2002). A controlled pilot study of stress management training of elderly patients with congestive heart failure. *Preventive Cardiology*, 5 (4), 168-172, 176.
- Lutz, A., Greischar, L. L., Rawlings, N. B., Ricard, M., & Davidson R. J. (2004). Long-term meditators self-induce high-amplitude gamma synchrony during mental practice. *Proceedings of the National Academy of Sciences USA*, 101 (46), 16369-16373.
- Mauskop, A. (2005). Vagus nerve stimulation relieves chronic refractory migraine and cluster headaches. *Cephalalgia*, 25 (2), 82-86.
- McCraty, R. (2003). *Heart-brain neurodynamics: The making of emotions* (Publication No. 03-015). Boulder Creek, CA: HeartMath Research Center, Institute of HeartMath. Retrieved from <http://store.heartmath.org/store/e-books/heart-brain-neurodynamics>
- McCraty R. (2004). The energetic heart: Bioelectromagnetic communication within and between people. In P. J. Rosch & M. S. Markov (Eds.), *Bioelectromagnetic medicine* (pp. 541-562). New York, NY: Marcel Dekker. (An expanded version of this publication, *The energetic heart: Bioelectromagnetic interactions within and between people*, is available at <http://store.heartmath.org/store/e-books/energetic-heart>)
- McCraty, R., Atkinson, M., & Bradley, R. T. (2004a). Electrophysiological evidence of intuition: Part 1. The surprising role of the heart. *Journal of Alternative and Complementary Medicine*, 10 (1), 133-143.

- McCraty, R., Atkinson, M., & Bradley, R. T. (2004b). Electrophysiological evidence of intuition: Part 2. A system-wide process? *Journal of Alternative and Complementary Medicine*, *10* (2), 325-336.
- McCraty, R., Atkinson, M., & Lipsenthal, L. (2000). *Emotional self-regulation program enhances psychological health and quality of life in patients with diabetes* (Publication No. 00-006). Boulder Creek, CA: HeartMath Research Center, Institute of HeartMath. Retrieved from <http://www.heartmath.org/research/rp-emotional-self-regulation-program-enhances-psychological-health-and-quality-of-life-in-patients.html>
- McCraty, R., Atkinson, M., Lipsenthal, L., & Arguelles L. (2003). *Impact of the power to change performance program on stress and health risks in correctional officers* (Report No. 03-014). Boulder Creek, CA: HeartMath Research Center, Institute of HeartMath.
- McCraty, R., Atkinson, M., Rein, G., & Watkins, A. D. (1996). Music enhances the effect of positive emotional states on salivary IgA. *Stress Medicine*, *12* (3), 167-175.
- McCraty, R., Atkinson, M., Tiller, W. A., Rein, G., & Watkins, A. D. (1995). The effects of emotions on short-term heart rate variability using power spectrum analysis. *American Journal of Cardiology*, *76* (14), 1089-1093.
- McCraty, R., Atkinson, M., & Tomasino, D. (2001). *Science of the heart: Exploring the role of the heart in human performance* (Publication No. 01-001). Boulder Creek, CA: HeartMath Research Center, Institute of HeartMath. Retrieved from <http://www.heartmath.org/research/science-of-the-heart.html>
- McCraty, R., Atkinson, M., & Tomasino, D. (2003). Impact of a workplace stress reduction program on blood pressure and emotional health in hypertensive employees. *Journal of Alternative and Complementary Medicine*, *9* (3), 355-369.
- McCraty, R., Atkinson, M., Tomasino, D., Goelitz, J., & Mayrovitz, H. N. (1999). The impact of an emotional self-management skills course on psychosocial functioning and autonomic recovery to stress in middle school children. *Integrative Physiological and Behavioral Science*, *34* (4), 246-268.
- McCraty, R., Barrios-Choplin, B., Rozman, D., Atkinson, M., & Watkins, A. D. (1998). The impact of a new emotional self-management program on stress, emotions, heart rate variability, DHEA and cortisol. *Integrative Physiological and Behavioral Science*, *33* (2), 151-170.
- McCraty, R., & Childre, D. (2004). The grateful heart: The psychophysiology of appreciation. In R. A. Emmons & M. E. McCullough (Eds.), *The psychology of gratitude* (pp. 230-255). New York, NY: Oxford University Press. (An expanded version of this publication, *The appreciative heart: The psychophysiology of positive emotions and optimal functioning*, is available at <http://store.heartmath.org/store/e-books/appreciative-heart>)
- McCraty, R., & Tomasino, D. (2006). Emotional stress, positive emotions, and psychophysiological coherence. In B. B. Arnetz & R. Ekman (Eds.) *Stress in Health and Disease* (pp. 342-365), Weinheim, Germany: Wiley-VCH.
- McCraty, R., & Tomasino, D. (2006). The coherent heart: Heart-brain interactions, psychophysiological coherence, and the emergence of system wide order (Publication No. 06-022). Boulder Creek, CA: HeartMath Research Center, Institute of HeartMath.
- McCraty, R., & Tomasino, D. (2004, November). Heart rhythm coherence feedback: A new tool for stress reduction, rehabilitation, and performance enhancement. In *Proceedings of the First Baltic Forum on Neuronal Regulation and Biofeedback*, Riga, Latvia. Retrieved from <http://www.heartmath.org/research/publications.html>

- Medalie, J. H., & Goldbourt, U. (1976). Angina pectoris among 10,000 men. II. Psychosocial and other risk factors as evidenced by a multivariate analysis of a five-year incidence study. *American Journal of Medicine*, 60 (6), 910-921.
- Montoya, P., Schandry, R., & Muller, A. (1993). Heartbeat evoked potentials (HEP), Topography and influence of cardiac awareness and focus of attention. *Electroencephalography and Clinical Neurophysiology*, 88, 163-172.
- Moskowitz, J. T. (2003). Positive affect predicts lower risk of AIDS mortality. *Psychosomatic Medicine*, 65 (4), 620-626.
- Mukoyama, M., Nakao, K., Hosoda, K., Suga, S., Saito, Y., Ogawa, Y., . . . Yasue H. (1991). Brain natriuretic peptide as a novel cardiac hormone in humans. Evidence for an exquisite dual natriuretic peptide system, atrial natriuretic peptide and brain natriuretic peptide. *Journal of Clinical Investigation*, 87 (4), 1402-1412.
- Nadeau, R., & Kafatos, M. (1999). *The non-local universe: The new physics and matters of the mind*. New York, NY: Oxford University Press.
- Nakaya, Y. (1984). Magnetocardiography: A comparison with electrocardiography. *Journal of Cardiology Supplement*, 3, 31-40.
- Nunez, P. L. (2000). Toward a quantitative description of large-scale neocortical dynamic function and EEG. *Behavioral and Brain Sciences*, 23 (3), 371-398, discussion 399-437.
- Nunn, C. M., & Osselton, J. W. (1974). The influence of the EEG alpha rhythm on the perception of visual stimuli. *Psychophysiology*, 11 (3), 294-303.
- Oppenheimer, S., & Hopkins, D. (1994). Suprabulbar neuronal regulation of the heart. In J.A. Armour & J. L. Ardell (Eds.), *Neurocardiology* (pp. 309-341). New York, NY: Oxford University Press.
- Ostir, G. V., Markides, K. S., Black, S. A., & Goodwin, J. S. (2000). Emotional well-being predicts subsequent functional independence and survival. *Journal of the American Geriatrics Society*, 48 (5), 473-478.
- Ostir, G. V., Markides, K. S., Peek, M. K., & Goodwin, J. S. (2001). The association between emotional well-being and the incidence of stroke in older adults. *Psychosomatic Medicine*, 63 (2), 210-215.
- Peng, C. K., Buldyrev, S. V., Hausdorff, J. M., Havlin, S., Mietus, J. E., Simons, M., . . . Goldberger, A. L. (1994). Non-equilibrium dynamics as an indispensable characteristic of a healthy biological system. *Integrative Physiological and Behavioral Science*, 29 (3), 283-293.
- Porges, S. W. (1992). Vagal tone: A physiologic marker of stress vulnerability. *Pediatrics*, 90 (3, Pt. 2), 498-504.
- Pribram, K. H. (1971). *Languages of the brain*. New York, NY: Brandon House.
- Pribram, K. H. (1991). *Brain and perception: Holonomy and structure in figural processing*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Pribram, K. H., & Bradley, R. T. (1998). The brain, the me, and the I. In M. Ferrari & R. Sternberg (Eds.), *Self-awareness: Its nature and development* (pp. 273-307). New York, NY: The Guilford Press.
- Pribram, K. H., & Melges, F. T. (1969) Psychophysiological basis of emotion. In P. J. Vinken & G. W. Bruyn (Eds.), *Handbook of clinical neurology* (pp. 316-341). Amsterdam: North-Holland Publishing Company.
- Randich, A., & Gebhart, G. F. (1992). Vagal afferent modulation of nociception. *Brain Research Reviews*, 17, 77-99.
- Rapgay, L. (n.d.) Unpublished results.

- Raschke, F. (1986a). Coordination in the circulatory and respiratory systems. In L. Rensing, U. an der Heiden, & M. C. Mackey (Eds.), *Temporal disorder in human oscillatory systems* (pp. 152-158). Berlin Springer-Verlag.
- Raschke, F. (1986b). The hierarchical order of cardiovascular-respiratory coupling. In P. Grossman, K. H. L. Janssen, & D. Vaitl (Eds.), *Cardiorespiratory and cardiosomatic psychophysiology* (pp. 207-217). New York, NY: Plenum Press.
- Ratey, J. J. (2001). *A user's guide to the brain perception, attention, and the four theaters of the brain*. New York, NY: Pantheon Books.
- Rau, H., Pauli, P., Brody, S., Elbert, T., & Birbaumer, N. (1993). Baroreceptor stimulation alters cortical activity. *Psychophysiology*, 30 (3), 322-325.
- Rein, G., Atkinson, M., & McCraty, R. (1995). The physiological and psychological effects of compassion and anger. *Journal of Advancement in Medicine*, 8 (2), 87-105.
- Rice, D. M., & Hagstrom, E. C. (1989). Some evidence in support of a relationship between human auditory signal-detection performance and the phase of the alpha cycle. *Perceptual and Motor Skills*, 69 (2), 451-457.
- Russek, L. G., & Schwartz, G. E. (1994). Interpersonal heart-brain registration and the perception of parental love: A 42 year follow-up of the Harvard Mastery of Stress Study. *Subtle Energies*, 5 (3), 195-208.
- Russek, L. G., & Schwartz, G. E. (1996). Energy cardiology: A dynamical energy systems approach for integrating conventional and alternative medicine. *Advances*, 12 (4), 4-24.
- Russek, L. G., & Schwartz, G. E. (1997). Feelings of parental caring predict health status in midlife: A 35-year follow-up of the Harvard Mastery of Stress Study. *Journal of Behavioral Medicine*, 20 (1), 1-13.
- Sandman, C. A., Walker, B. B., & Berka, C. (1982). Influence of afferent cardiovascular feedback on behavior and the cortical evoked potential. In J. T. Cacioppo & R. E. Petty (Eds.), *Perspectives in cardiovascular psychophysiology* (189-222). New York, NY: The Guilford Press.
- Santa Maria, M., King, J., Xie, M., Zheng, B., Pribram, K. H., & Doherty, D. (1995). Responses of somatosensory cortical neurons to spatial frequency and orientation: A progress report. In J. S. King & K. H. Pribram (Eds.), *Scale in conscious experience: Is the brain too important to be left to specialists to study?* Mahwah, NJ: Lawrence Erlbaum Associates.
- Schandry, R., & Montoya, P. (1996). Event-related brain potentials and the processing of cardiac activity. *Biological Psychology*, 42, 75-85.
- Schandry, R., Sparrer, B., & Weitkunat, R. (1986). From the heart to the brain: A study of heartbeat contingent scalp potentials. *International Journal of Neuroscience*, 30, 261-275.
- Schofl, C., Prank, K., & Brabant, G. (1995). Pulsatile hormone secretion for control of target organs. *Wiener Medizinische Wochenschrift*, 145 (17-18), 431-435.
- Schore, A. N. (1994). *Affect regulation and the origin of the self: The neurobiology of emotional development*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Seeman, T. E., & Syme, S. L. (1987). Social networks and coronary artery disease: A comparison of the structure and function of social relations as predictors of disease. *Psychosomatic Medicine*, 49 (4), 341-354.
- Siddle, B. K. (1995). *Sharpening the warrior's edge: The psychology and science of training*. Millstadt, IL: PPCT Research Publications, PPCT Management Systems.

- Siegel, G., Ebeling, B. J., Hofer, H. W., Nolte, J., Roedel, H., & Klubendorf, D. (1984). Vascular smooth muscle rhythmicity. In K. Miyakawa, H. P. Koepchen, & C. Polosa (Eds.), *Mechanisms of blood pressure waves* (pp. 319-338). Tokyo: Japan Scientific Societies Press.
- Song, L. Z., Schwartz, G. E., & Russek, L. G. (1998). Heart-focused attention and heart-brain synchronization: Energetic and physiological mechanisms. *Alternative Therapies in Health and Medicine*, 4 (5), 44-62.
- Strohle, A., Kellner, M., Holsboer, F., & Wiedemann K. (1998). Atrial natriuretic hormone decreases endocrine response to a combined dexamethasone-corticotropin-releasing hormone test. *Biological Psychiatry*, 43 (5), 371-375.
- Svensson, T. H., & Thoren, P. (1979). Brain noradrenergic neurons in the locus coeruleus: Inhibition by blood volume load through vagal afferents. *Brain Research*, 172 (1), 174-178.
- Telegdy, G. (1994). The action of ANP, BNP and related peptides on motivated behavior in rats. *Reviews in the Neurosciences*, 5 (4), 309-315.
- Tiller, W. A., McCraty, R., & Atkinson, M. (1996). Cardiac coherence: A new, noninvasive measure of autonomic nervous system order. *Alternative Therapies in Health and Medicine*, 2 (1), 52-65.
- Turpin, G. (1986). Cardiac-respiratory integration: Implications for the analysis and interpretation of phasic cardiac responses. In P. Grossman, K. H. L. Janssen, & D. Vaitl (Eds.), *Cardiorespiratory and cardiosomatic psychophysiology* (139-155). New York, NY: Plenum Press.
- Van der Molen, M. W., Somsen, R. J. M., & Orlebeke, J. F. (1985). The rhythm of the heart beat in information processing. In P. K. Ackles, J. R. Jennings, M. G. H. Coles (Eds.), *Advances in psychophysiology* (Vol. 1) (pp. 1-88). London, England: JAI Press.
- Velden, M., & Juris, M. (1975). Perceptual performance as a function of intra-cycle cardiac activity. *Psychophysiology*, 12 (6), 685-692.
- Vollmar, A. M., Lang, R. E., Hanze, J., & Schulz, R. (1990). A possible linkage of atrial natriuretic peptide to the immune system. *American Journal of Hypertension*, 3 (5, Pt. 1), 408-411.
- Walker, B. B., & Walker, J. M. (1983). Phase relations between carotid pressure and ongoing electrocortical activity. *International Journal of Psychophysiology*, 1 (1), 65-73.
- Wesnes, K. A., Ward, T., McGinty, A., & Petrini O. (2000). The memory enhancing effects of a Ginkgo biloba/Panax ginseng combination in healthy middle-aged volunteers. *Psychopharmacology*, 152 (4), 353-361.
- Wolf, S. (1995). Oscillatory functions affecting outcome of coronary heart disease: The hazard of too much or too little stability. *Integrative Physiological and Behavioral Science*, 30 (2), 118-126.
- Wölk, C., & Velden, M. (1987). Detection variability within the cardiac cycle: Toward a revision of the "baroreceptor hypothesis." *Journal of Psychophysiology*, 1, 61-65.
- Wölk, C., & Velden, M. (1989). Revision of the baroreceptor hypothesis on the basis of the new cardiac cycle effect. In N. W. Bond & D. A. T. Siddle (Eds.), *Psychobiology: Issues and applications* (pp. 371-379). North-Holland: Elsevier Science Publishers.
- Wölk, C., Velden, M., Zimmerman, U., & Krug, S. (1989). The interrelation between phasic blood pressure and heart rate changes in the context of the "baroreceptor hypothesis." *Journal of Psychophysiology*, 3, 397-402.

Zhang, J. X., Harper, R. M., & Frysinger, R. C. (1986). Respiratory modulation of neuronal discharge in the central nucleus of the amygdala during sleep and waking states. *Experimental Neurology*, 91, 193-207.

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www.heartmath.org/research/publications.html

Appendixes

Appendix A: Modes of Psychophysiological Function

In the course of our research on the relationship between HRV and emotion, we observed that certain psychophysiological states were consistently associated with distinct psychological and behavioral correlates as well as with specific patterns of physiological activity throughout the body. As these systemic patterns were found to hold over many trials across diverse study populations, we concluded that they constituted six general categories of psychophysiological function, which we call *modes*, each of which is distinguished by a unique set of characteristics. Although there is individual variation within each mode, there are broader empirical commonalities that are characteristic of each mode and that differentiate the six modes from one another.

Four of these psychophysiological modes are readily generated in the context of everyday life. We have termed these modes *Mental Focus* (associated with impassive emotions experienced while attention is directed to performing familiar, cognitively engaging tasks or actions), *Psychophysiological Incoherence* (associated with negative emotions such as anger, anxiety, etc.), *Relaxation* (associated with calm emotions experienced while resting from the effort and stress of everyday life), and *Psychophysiological Coherence* (associated with positive emotions such as appreciation, care, compassion, etc.). We have also identified two additional modes, *Emotional Quiescence* and *Extreme Negative Emotion*, which both appear to belong to a qualitatively different category of psychophysiological function. These two modes are physiologically and experientially distinct from the other four modes and are generated under more extraordinary life circumstances. Before moving on to describe the emotional tone and empirical characteristics of each of these modes, it is necessary to provide some information on the heart rhythm data presented in the graphs in this section.

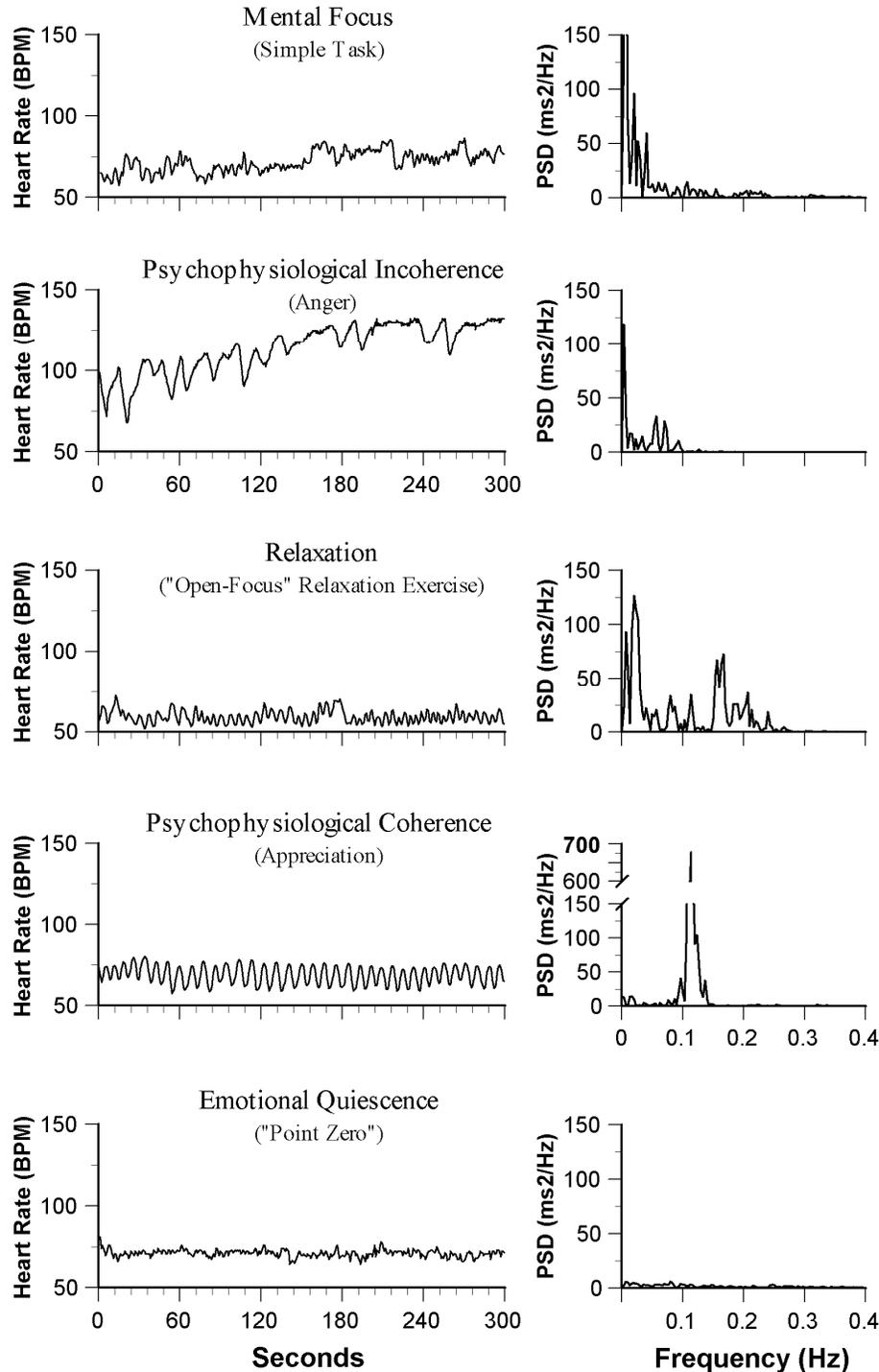


Figure 8. Heart rhythm patterns during different psychophysiological modes.

The left-hand graphs are heart rate tachograms, which show beat-to-beat changes in heart rate. To the right are the heart rate variability power spectral density (PSD) plots of the tachograms at left. While there are individual variations in the HRV patterns associated with each mode, the examples depicted are typical of the characteristic aspects of the more general patterns observed for each mode. *Mental Focus* is characterized by reduced HRV. Activity in all three frequency

bands of the HRV power spectrum is present. Anger, an example of the *Psychophysiological Incoherence* mode, is characterized by a lower frequency, more disordered heart rhythm pattern and increasing mean heart rate. As can be seen in the corresponding power spectrum to the right, the rhythm during anger is primarily in the very low frequency region, which is associated with sympathetic nervous system activity. In this example, the anger was intense enough to drive the system into an extreme state, where the heart rhythm trace became flat (indicating very low HRV) around 200 seconds. *Relaxation* results in a higher frequency, lower amplitude rhythm, indicating reduced autonomic outflow. In this case, increased power in the high frequency region of the power spectrum is observed, reflecting increased parasympathetic activity (the relaxation response). *Psychophysiological Coherence*, which is associated with sustained positive emotions (in this example, appreciation), results in a highly ordered, sine-wave-like heart rhythm pattern. As can be seen in the corresponding power spectrum, this psychophysiological mode is associated with a large, narrow peak in the low frequency region, centered around 0.1 Hz. Note the scale difference in the amplitude of the spectral peak during the coherence mode. This indicates system-wide resonance, increased synchronization between the sympathetic and parasympathetic branches of the nervous system, and entrainment between the heart rhythm pattern, respiration, and blood pressure rhythms. The coherence mode is also associated with increased parasympathetic activity, thus encompassing a key element of the relaxation response, yet it is physiologically distinct from relaxation because the system is oscillating at its resonant frequency and there is increased harmony and synchronization in nervous system and heart–brain dynamics. The *Emotional Quiescence* mode is characterized by state-specific very low HRV. Due to the low HRV, the power spectrum has very little power in any of the three frequency regions.

Figure 8 shows the typical heart rhythm patterns and the associated HRV power spectra for the six psychophysiological modes we have identified. These patterns are reflective of the ongoing adjustments of the various physiological systems in relation to the ever-changing processes in the body and in the external environment. The normal variability in heart rate is due to the synergistic action of the two branches of the ANS, which act to maintain cardiovascular parameters in their optimal ranges and to permit appropriate reactions to changing external or internal conditions. In a healthy individual, the heart rate estimated at any given time represents the net effect of the parasympathetic (vagus) nerves, which slow heart rate, and the sympathetic nerves, which accelerate it. We use the term *adaptive variability* to denote these ongoing moment-by-moment accommodations. Within normal parameters, greater amplitudes of oscillation are associated with health. Thus, the amplitude of rhythmic physiological processes, such as heart rhythms, may index the health status of the individual's nervous system and capacity to respond to environmental demands (Friedman & Thayer, 1998; Peng et al., 1994; Porges, 1992; Wolf, 1995).

The left-hand graphs are heart rate tachograms, which show the beat-to-beat changes in heart rate (heart rhythms) in the different modes. These patterns have been identified in recordings obtained both in the laboratory and in real-life circumstances from a database of more than one thousand cases.

To the right are shown the heart rate variability power spectral density (PSD) plots for each of the heart rhythms. To discriminate and quantify sympathetic and parasympathetic activity and

total autonomic nervous system activity, the HRV data must be converted into their spectral components. This is done by applying a mathematical transformation, the Fast-Fourier Transform. The resultant power spectrum reduces the heart rhythm into its constituent frequency components. These are divided into three main frequency ranges, each of which corresponds to a specific physiological activity and rhythm.

The very low frequency (VLF) range (0.0033–0.04 Hz) is primarily an index of sympathetic activity, while power in the high frequency (HF) range (0.15–0.4 Hz), representing more rapid beat-to-beat changes in heart rate, is primarily due to parasympathetic activity. The frequency range encompassing the 0.1 Hz region is called the low frequency (LF) range (0.04–0.15 Hz) and reflects activity in the feedback loops between the heart and brain that control short-term blood pressure changes and other regulatory processes. The physiological factors contributing to activity in the LF range are complex, reflecting a mixture of sympathetic and parasympathetic efferent and afferent activity as well as vascular system resonance.

The six psychophysiological modes we have identified will next be distinguished in terms of their emotional tone and associated heart rhythm and ANS activation patterns. It should be noted that these modes can also be distinguished on the basis of the patterns of their associated energetic (electromagnetic) activity; this is discussed in Appendix E.

Modes of Everyday Psychophysiological Function

Mental Focus

The top graph in Figure 8 depicts a typical heart rhythm pattern and the associated HRV power spectrum during a period of “mental focus.” We use this term to describe an impassive emotional state experienced while performing a familiar, routine task or action. This state is primarily one of mental attention to the task at hand and, as such, is characterized by little or no emotional arousal, either of a positive or negative nature, and low motor activity. In the example shown in Figure 8, the research subject was sitting quietly while focused on a routine computer task. As depicted in the heart rhythm graph (left-hand side), the HRV pattern is relatively constrained in its overall amplitude variation, and there is less higher frequency variability as compared to the pattern for relaxation.

The HRV power spectrum (right-hand side of Figure 8) shows some activity in all three frequency bands, as would be expected from examining the heart rhythm trace. The multiple peaks present in the VLF region indicate that the organization of oscillations in this band is unstable and variable; this is apparent in the heart rhythm data as well. The fact that the overall heart rate remains relatively constant (approximately 70 bpm), indicates, in this example, that there was not an increased activation of the sympathetic nervous system. However, there appears to be less synchronized activity in overall ANS function as compared to the coherence or relaxation modes, which is reflected in the more erratic heart rhythm pattern. The power in the HF band is much lower than that in the Relaxation mode, indicating there is less parasympathetic activity. This typically correlates with shallower, faster breathing rhythms. There is also reduced power in the LF band, which is a common finding in tasks that require primarily mental focus with little motor activity. In sum, these data show that there is reduced autonomic activity and

overall HRV during periods of mental focus when compared to the relaxation or coherence modes.

Psychophysiological Incoherence

Psychophysiological Incoherence is associated with negative emotions, such as anger, frustration, and anxiety. While there is some variation within this mode in the morphology of the associated HRV waveforms, Psychophysiological Incoherence is generally typified by an erratic and disordered heart rhythm pattern (see the example of frustration in Figure 1). The example of this mode shown in Figure 8 was recorded when this individual was experiencing an episode of anger during an argument with his wife while sitting still in a car. In this case, the emotion of anger was sufficiently intense to activate the sympathetic nervous system, resulting in a more pronounced VLF rhythm and an increasing mean heart rate. As can be seen in the corresponding power spectrum to the right, there is a single large peak in the VLF region, which indicates sustained sympathetic activation, whereas the HF region shows virtually no activity. The activity in the LF region remains strong because the physiological mechanisms regulating blood pressure are active in order to maintain control and inhibit sympathetic outflow so that the blood pressure does not reach levels that will harm the system.

In addition to the Psychophysiological Incoherence mode, which is the main pattern observed in this recording, parts of this same recording also show another pattern of psychophysiological response that is indicative of a different mode, evident in the segments circled in Figure 8. This pattern illustrates what happens when an individual experiences an extreme negative emotion—in this case, intense anger. Extreme negative emotions such as this can lead to excessive sympathetic activation, in which the heart rate increase approaches the range of maximum function and where the heart rate variability pattern almost flattens out. We believe that this psychophysiological pattern is indicative of a "hyper-state" of extreme negative emotional experience, which is described in more detail below.

Relaxation

The Relaxation mode is a state of emotional calm experienced when resting from the activity and stress of everyday life. It is characterized by a higher frequency, lower amplitude rhythm, and a virtually steady heart rate (approximately 60 bpm in this example) once the system has stabilized in this mode. In the beginning of the shift into relaxation, however, there is also typically a decrease in heart rate, which indicates a reduction in overall autonomic outflow and a shift in autonomic balance towards increased parasympathetic activity. This example (Figure 8) is from a case in a study in which the research subjects were instructed to sit quietly and not to engage in any active cognitive or emotional processing or to use any specific meditative or emotional management techniques. The increased parasympathetic activity can be clearly seen in the relatively large peak in the HF band of the power spectrum. There is also activity in both the VLF and LF bands because the sympathetic and blood pressure control rhythms are still active (as would be expected), although there is shift to increased parasympathetic activity (the relaxation response) and lower overall HRV. This same rhythm and power spectral signature are also seen during periods of restful sleep.

It is imperative that the Relaxation mode not be confused or confounded with the Psychophysiological Coherence mode described next. There is typically an overall reduction in ANS outflow and a shift in ANS balance towards increased parasympathetic activity during periods of rest or relaxation, or with structured relaxation or meditation techniques (resulting in lower HRV). Although the coherence mode is also associated with increased parasympathetic activity, and thus encompasses a key element of the relaxation response, relaxation and meditation are *not* usually associated with significant increases in physiological coherence. Not only are there fundamental differences between the physiological correlates of relaxation and coherence, but the associated psychological states are also markedly different. Many relaxation and mediation techniques (with specific exceptions) are essentially disassociation techniques, whereas the psychological states associated with coherence are directly related to activated positive emotions.¹⁶

Psychophysiological Coherence

The example of the Psychophysiological Coherence mode shown in Figure 8 was generated when this research participant was instructed to activate and sustain a genuine feeling of “appreciation.” The graph shows how sustained, modulated positive emotions, such as appreciation or love, are associated with a highly ordered, smooth, sine-wave-like heart rhythm pattern (coherence). It is important to understand that although the coherence mode is typically associated with increased parasympathetic activity, whether a shift in heart rate (either up or down) occurs depends on the preceding psychophysiological state of the individual. The coherence mode thus does not necessarily involve a change in *heart rate* per se, or a change in the *amount* of heart rate variability. Rather, it is signified by a shift to a distinctive heart rhythm *pattern*.

As can be seen in the corresponding power spectrum, this psychophysiological mode is associated with an unusually high-amplitude peak in the LF band, centered around 0.1 Hz. To appreciate the magnitude of this difference relative to the other five modes, it is important to observe that there is a scale difference in the amplitude of the spectral peak in the LF region in the coherence mode¹⁷ (note the changed ordinate scale for Appreciation relative to the other

¹⁶ Meditation and relaxation techniques can be inappropriately thought to induce coherence when they are combined with specific breathing techniques, because certain paced breathing rhythms also induce the physiological coherence mode.

¹⁷ When speaking of coherence in a psychophysiological context, it is important to note the distinction between types of patterns that are associated with organized, healthy function and those that underlie pathology. Within normal parameters, a greater amplitude of oscillation in heart rate variability and most other physiological processes is associated with health. Thus, the amplitude of the oscillations associated with the heart’s rhythm is a general index of the status of the individual’s nervous system and capacity to respond to change. In other words, the greater the amplitude of “organized” rhythmic physiological variability, the greater the response potential or possible range of behavior. This is relevant to our discussion of coherence because many illnesses are characterized by a reduction in the complexity of the patterns of activity generated by the body’s systems (i.e., previously complex rhythms and patterns become strikingly periodic and predictable). For example, a low overall HRV is associated with autonomic neuropathy and autonomic deinnervation (as found in heart transplant recipients) and is

modes): the top of the peak is near 700 while it is below 150 in all of the other examples. This indicates system-wide resonance, increased synchronization between the sympathetic and parasympathetic branches of the nervous system, and entrainment between the heart rhythm pattern, respiration, and blood pressure rhythms.

One may observe that the heart rhythm in both the relaxation and coherence modes can manifest a sine-wave-like pattern. In the psychophysiological coherence mode, however, this pattern occurs at a lower frequency and typically with a higher amplitude. Even more significantly, in the coherence mode increased synchronization, resonance, and entrainment across multiple bodily systems occur, all of which reflect a level of global organization that is not present in the relaxation mode.

Although in relaxation increased auto-coherence can occur in the breathing rhythm (as in the example shown in Figure 8) and it is also possible to have a type of entrainment between the respiration and heart rhythms, these characteristics are *not* reflective of the system-wide entrainment or resonance that typify psychophysiological coherence. The type of entrainment that is sometimes observed in the relaxation mode occurs in the high frequency range of the HRV power spectrum and is associated with respiratory sinus arrhythmia (RSA), which is discussed in detail in the main text.

We have found that as the respiratory rate is lowered, there is a tipping point (typically below 0.26 Hz) at which the heart rate variability pattern, blood pressure rhythm and respiratory rhythms suddenly entrain. In essence, the system jumps to a different physiological mode and settles into a new oscillatory rhythm at its resonant frequency. In the majority of people, the lower and upper thresholds for the onset of the coherence mode are approximately 0.04 and 0.26 Hz, respectively, in the HRV power spectrum, but the rhythm typically settles at the system's resonant frequency of ~0.1 Hz.

Modes Distinguished by Low Variability

As noted previously, we have empirical evidence of two additional modes that appear to belong to a qualitatively different category of psychophysiological function than the four modes of everyday function just described. What sets these patterns apart is that they are not typically experienced in the course of normal everyday life but, instead, occur under extraordinary or unusual circumstances. Also, they are physiologically and experientially distinct—physiologically, they are both associated with very low heart rate variability; experientially, they are at opposite ends of the spectrum, with one mode being associated with an uncommon sense of inner peace and the other mode associated with extreme negative emotions such as anger and rage.

predictive of increased risk of sudden cardiac death and all-cause mortality. Low HRV is also associated with depression, anxiety and many other psychological disorders.

This loss of variability and complexity is quite different from the type of coherence we are describing. The coherent mode described here is not characterized by a loss of variability, but rather by the emergence of a more organized variability. Additionally, it is important to note that these are not steady states, such as those associated with disease; rather, they are highly dynamic and changing.

Emotional Quiescence

In addition to the psychophysiological coherence mode, there is also another, less common mode—“Emotional Quiescence”—that emerges when certain individuals undergo an extraordinary transition to enter a distinctive heart-focused psychophysiological state (see Figure 9). The specific HeartMath tool that practitioners use to enter this mode is called the Point Zero technique.

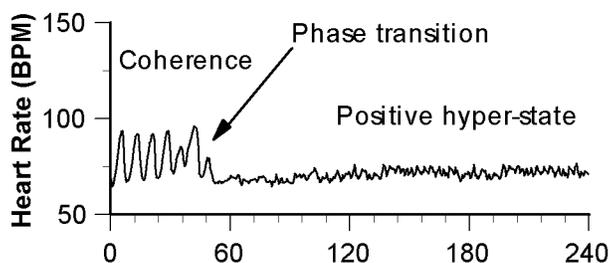


Figure 9. Phase-shift to a positive hyper-state. This figure shows a typical example of the phase transition observed in a subject moving from the Psychophysiological Coherence mode to a positive hyper-state we call Emotional Quiescence. Note the abrupt change from the larger-amplitude sine-wave-like heart rhythm pattern distinguishing the Coherence mode to the much higher-frequency and lower-amplitude rhythm marking the Emotional Quiescence positive hyper-state.

The subjective experience of this mode is a state in which the intrusion of mental and emotional “chatter” is reduced to a point of internal quietness, to be replaced by a profound feeling of peace and serenity and a deep sense of being centered in the heart.¹⁸ First-person descriptions include a heightened awareness of the movement of energy both within one’s body and between oneself and other people; the feeling of being “totally alive” and “fully present” in the moment; the experience of an all-embracing, non-judgmental love (in the largest sense); and a sense of increased connectedness with one’s higher self or spirit, and with “the whole.” It is important to point out that many experienced mediators who have learned the Point Zero technique describe their subjective experience of Emotional Quiescence as a distinctly different state than is typically experienced through meditation approaches.

Physiologically, when an individual enters the Emotional Quiescence mode, either the sympathetic and parasympathetic outflow from the brain to the heart is substantially reduced, or an energetic control acting at the level of the heart itself is activated to such a degree that the beat-to-beat oscillations in the HRV waveform become nearly zero. It is also possible that both occur simultaneously. This leads to an HRV power spectrum with unusually low power in all the

¹⁸In earlier publications we used the term “internal coherence” to describe the physiological aspects of this mode; however, we now feel that this terminology is confusing, as the term “coherence” is better used in the broader context which embraces entrainment, resonance, and synchronization. We also used the term “amplified peace” in earlier publications to describe the subjective inner state.

frequency bands.¹⁹ As shown in Figure 8, the heart rhythm is almost a flat line and therefore the power spectrum has almost no power in any of the frequency bands due to the lack of heart rate variability.

Extreme Negative Emotion

At the opposite end of the emotional spectrum lies a second unusual non-everyday psychophysiological mode. Individuals can enter this mode when experiencing extremely activated negative emotions, such as those that occur during episodes of intense fear, anger, or rage. In the Extreme Negative Emotion mode the heart rhythms are also reduced to a flat-line appearance. However, in contrast to Emotional Quiescence, the underlying physiological mechanism is quite different. In this mode the HRV becomes very low due to excessive sympathetic outflow to the heart, which both drives the heart rate up to very high rates and inhibits parasympathetic outflow to the heart. At higher heart rates there is less time for variation in the beat-to-beat heart rate to occur,²⁰ and this combined with the inhibition of parasympathetic outflow reduces the amplitude of the variations in heart rate to nearly zero. An example of this mode can be seen in the latter part of the heart rhythm trace shown in Figure 10. Although the HRV power spectra for the Extreme Negative Emotion and Emotional Quiescence modes appear very similar, these modes are readily distinguished by the overall heart rate and by the ECG spectrum (discussed later).

¹⁹ It is important to note that the individuals we have studied have the ability to enter this mode at will and thus demonstrate exceptional self-regulation because their HRV is normally quite large. This can be a source of confusion, as low HRV is usually associated with pathology. However, the state-specific, short-term low HRV associated with the Emotional Quiescence mode (or that seen in meditation) is markedly different from the low HRV found in pathological conditions. In pathology the HRV is *always* low and is associated with impaired function of the autonomic nervous system, heart, or brain stem centers.

²⁰ The link between heart rate and HRV is termed cycle length dependence. In healthy individuals as heart rate increases, HRV decreases, and vice versa.

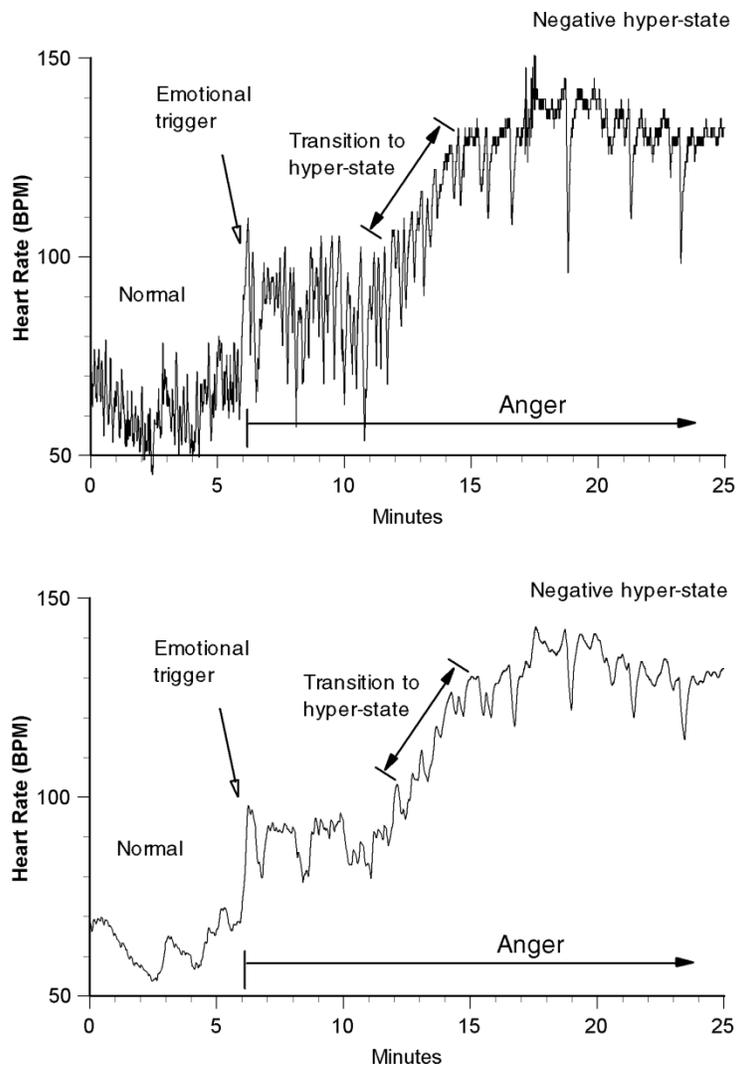


Figure 10. Phase-shift to a negative hyper-state. The heart rhythm data shown in the top graph were recorded from a male who was riding in a car and got into an argument with his wife. Before the argument and resulting emotional activation, the graph shows a period of “normal” psychophysiological activity. Clearly apparent is the point (spike) at which the subject’s emotion of anger was triggered. This was followed by a period (from about 6-12 minutes in the record) of sympathetic activation and increased heart rate. Next, there is evidence of a relatively rapid transition, which culminates in a phase-shift into a negative hyper-state of intense anger. As is evident from this case, the negative hyper-state is characterized by a high heart rate and significantly reduced HRV. The large downward spikes in the hyper-state waveform pattern, which indicate periodic drops in heart rate, result from the subject taking deep breaths. The bottom graph depicts a 10-second moving average of the heart rhythm data displayed in the top graph. This is shown to highlight the general morphology of the changes in heart rate and rhythm and the phase-transition between the states.

It should be noted that a similar pattern of physiological activity (high heart rate and low HRV) can also occur with sustained extreme physical exertion. As just described above, when the heart rate is driven so high that it all but reaches the heart’s physical limit, there is little space

for variation so that a greatly reduced HRV results. However, it is rare that an individual's system is driven to this extreme state through physical exertion. The fact that extreme negative emotions alone can drive the physiological systems to this same extreme state underscores the profound impact that such emotions can have on the body.

Extreme anger or rage is subjectively experienced as an intense, highly focused state that is usually directed outward. Individuals describe their subjective experience of this state as one that is highly energized and seething with negative emotion, with a feeling of increased physical power and a corresponding reduction in sensitivity to physical pain.

The empirical documentation of these two hyper-states of psychophysiological function has led us to postulate that there are at least four additional hyper-states that have yet to be discovered and empirically mapped. The basis for this expectation will become clear in the conceptual map we develop of emotional states and their associated distinguishing physiological characteristics.

Appendix B: Previous Research

The Baroreceptor Hypothesis: A Micro-Scale Perspective

Some of the most influential work on the relationship between heart–brain interactions and performance was conducted in the 1960s and 1970s by psychophysiologicals John and Beatrice Lacey, who postulated a causal role of the cardiovascular system in sensory-motor performance (Lacey, 1967; Lacey & Lacey, 1970, 1974). From a large body of electrophysiological and behavioral data they developed the “baroreceptor hypothesis,” which is also known as the “Lacey hypothesis.”

The Laceys’ hypothesis postulated that the cardiovascular system exerts a modulating influence on higher centers of the brain, including the cortex, via afferent input from the baroreceptors (mechanosensory neurites) in the heart, aortic arch, and carotid arteries (Lacey, 1967; Ostir et al., 2001). It was proposed that cortical activity is briefly inhibited as a result of this afferent input, and therefore that sensory intake will be enhanced at times when baroreceptor discharge is minimal. As some mechanosensory neurites are activated in a pulsating fashion in phase with the systolic blood pressure wave, the Laceys expected sensory-motor integration and performance to oscillate with this same rhythm. Behaviorally, this should be reflected in reduced perceptual and perceptual-motor performance in the case of an increase in baroreceptor activity and, accordingly, a performance increase in the case of reduced baroreceptor activity. The conclusion from such a finding would be that the cardiovascular system plays an instrumental role in modulating sensory input and perception.

The Laceys’ experimental work did in fact confirm a relationship between the heart’s activity and cognitive performance. A major focus of their research investigated subjects’ performance on reaction time tasks involving sensory intake. They found that a deceleration in heart rate during the anticipatory period preceding such a task was associated with improved cognitive performance (faster reaction time), and conversely, an acceleration in heart rate was associated with reduced cognitive performance (slower reaction time) (Ostir et al., 2001). They also observed in these experiments that the greater the magnitude of the heart rate deceleration, the faster the reaction time (Lacey & Lacey, 1964, 1970, 1974). These observations were consistent with the Laceys’ hypothesis: by their reasoning, a heart rate deceleration prior to receiving information from the environment was seen as an adaptive response to enhance sensory processing by increasing the probability that information will arrive at a time when the brain is minimally inhibited as a result of baroreceptor activity. This follows from the rationale that fewer ventricular contractions prior to environmental intake will result in less baroreceptor discharge and thus reduce cardiac-related cortical inhibition.

Although the Laceys’ own findings appeared to be consistent with the baroreceptor hypothesis, the results of numerous subsequent experiments by independent researchers investigating this relationship at normal heart rates have been highly inconsistent and contradictory (for reviews, see Sandman et al., 1982; van der Molen et al., 1985). Most of these studies sought to clarify the relationship between cardiovascular activity and perceptual processing by examining performance changes *within* a single cardiac cycle—that is, the period from one heartbeat to the next. Since it could be determined at what time the pulse wave reaches

the baroreceptors and how long it takes for the neural impulses to reach the cortex, the precise timing of the expected inhibitory effect could be predicted.

Among the experiments that did show “cardiac cycle effects,” different forms of performance change were found, and reductions in sensory or sensory-motor performance were observed at nearly *every part* of the cardiac cycle—a finding unexplainable by the baroreceptor hypothesis. However, while most of these studies presumed that blood pressure was the relevant factor, they relied only on heart rate data and assumed that blood pressure would drop with heart rate decreases and increase when heart rate increased. Unexpectedly, later studies found that heart rate and blood pressure are quite independent of each other under certain circumstances. In fact, it has been shown that in the protocol used (reaction time task with a warning stimulus) in most of the studies designed to test the Lacey hypothesis, blood pressure *increases* as heart rate decreases (Wölk, Velden, Zimmerman, & Krug, 1989). Clearly, then, these data were not consistent with the baroreceptor hypothesis, which predicted that *reduced* afferent activity preceded the processing of a significant external event.

The next major advancement in the understanding of how the activity of the heart modulates performance was provided by psychophysicists Christoph Wölk and Manfred Velden of the University of Osnabrück in Germany. These researchers revised the Laceys’ original hypothesis based on the results of several studies in which they presented a large number of auditory discrimination tasks (participants were asked to detect a tone embedded in noise) in very small steps (33 milliseconds) over the cardiac cycle. These experiments showed that performance actually fluctuated across the entire cardiac cycle at a rhythm around 10 Hz. In addition, as can be seen in Figure 11, there was an increase in the amplitude of the performance oscillation starting around 300 milliseconds after the R-wave.

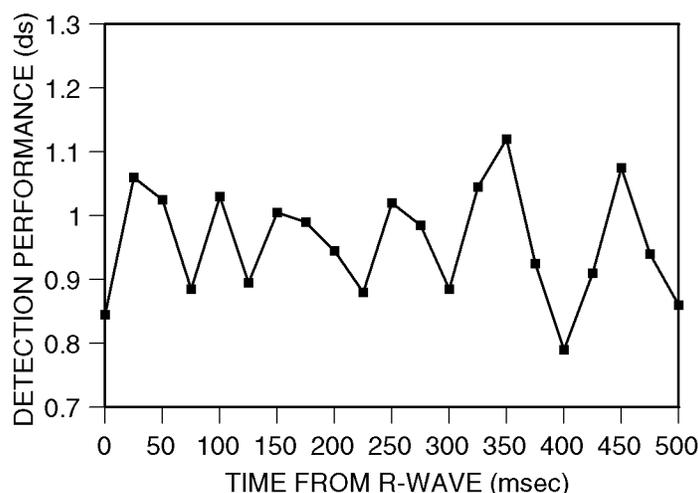


Figure 11. Performance over the cardiac cycle. By presenting a large number of performance tasks (detection of a masked audio stimulus) to subjects at differing times post R-wave, it was found that perceptual performance fluctuates with a frequency of about 10 Hz.⁹⁴ Figure shown with permission of C. Wölk and M. Velden.

The revised hypothesis proposes that the modulating influence of the activity of the mechanoreceptors on cortical function is not exerted directly, but rather is mediated via a

synchronizing effect of the pulsating afferent input from the heart on cells in the thalamus, which in turn synchronizes the brain's cortical activity (Velden & Juris, 1975; Wölk & Velden, 1987, 1989). It has long been thought that alpha wave activity emerges from a state of cortical-thalamic resonance, evoked by afferent neural activity (Andersen & Andersen, 1968; Birbaumer, 1975). Wölk and Velden reasoned that as the observed oscillation in performance was in the same frequency range as the EEG alpha rhythm (~8–12 Hz), the afferent input from the heart was modulating the alpha rhythm.²¹ This line of reasoning is consistent with the well-established finding that sensory-motor performance is dependent on the phase and amount of the alpha rhythm. Namely, higher levels of alpha activity are related to a decrease in performance; so also is the presentation of a stimulus during the higher-amplitude phase of the alpha rhythm (Callaway, 1962; Dustman & Beck, 1965; Nunn & Osselton, 1974; Rice & Hagstrom, 1989).²² Thus, if the alpha rhythm was synchronized to the heart, then oscillations in performance should also be synchronized to the heart.

In Wölk and Velden's revised baroreceptor hypothesis, the periodic fluctuations in perceptual performance over the cardiac cycle are due to the alpha cycle effect (performance depends on the phase of the alpha cycle in which the stimulus is presented). This, in turn, is caused by neuronal activity evoked by cardiovascular afferent input at the level of the thalamus. They called this effect "cardiac driving," in analogy to "photic driving," where rhythmic stimulation with a visual stimulus induces an increase in EEG alpha activity. Wölk and Velden assumed that the amount of cardiac driving depends on heart rate. Thus, they inferred that a heart rate deceleration is effectively a modulation mechanism the organism uses to prevent the onset of synchronized alpha activity when attending to external sensory information, as this synchronized activity would interfere with the transmission and processing of the information. They conclude, "This means that the synchronized brain activity resulting from the baroreceptor stimulation does not just stand for a state of brain inhibition, but constitutes the mechanism by which perceptual performance can be modulated" (Wölk & Velden, 1989, p. 373).

One of Wölk and Velden's important revisions to the baroreceptor hypothesis is that it is *heart rate*, and not blood pressure, that is the relevant aspect of cardiovascular activity in terms of its synchronizing effect on thalamic cells and therefore on the cortex. In neurological terms,

²¹ The observation that the brain's alpha rhythm is related to cardiovascular activity was first reported in 1955, when it was proposed that the transfer of mechanical energy from the contraction of the heart to the cerebrospinal fluid was a mechanism that may initiate and sustain synchronous brain activity (Bering, 1955; see also Kennedy, 1959). Sandman, Walker, and Berka (1982), who have extensively studied the influence of afferent cardiovascular feedback on the brain, published data in the early 1980s that supported this idea (Walker & Walker, 1983); however, the degree to which alpha activity is synchronized to the cardiac cycle still remained to be quantified.

²² It was proposed in 1961 that the EEG alpha rhythm is a direct reflection of a relatively large homogenous area of cortex synchronously undergoing cycles of alternating excitations and inhibitions at the same frequency as the alpha rhythm. This was thought of as a "neuronic input shutter," which periodically prevents the perception and processing of information by the brain as elemental operations are switching on and off (Lindsley, 1961). Although this micro-rhythm clearly exists, the alpha rhythm also likely reflects a large-scale structural synchrony related to integrative brain functions, such as sensory, motor, and cognitive processes (Fingelkurts et al., 2003).

thus, it is the *pattern* and *stability* of the afferent input that is significant here, and not the strength or number of the neural bursts originating from the mechanoreceptors (Wölk & Velden, 1989). In this model, in situations involving the intake of sensory information, a decrease in heart rate translates into a reduction in the probability of the occurrence of EEG alpha activity.

In essence, Wölk and Velden concluded that while the baroreceptor hypothesis in its original form is correct with respect to the modulating effect on sensory-motor performance by the heart, the underlying mechanisms proposed in the original version of the hypothesis were incorrect. Their findings explain why the results of previous studies were so variable and contradictory—on the basis of the original hypothesis, most researchers were expecting to find a performance rhythm of a much slower frequency, and thus they traced performance over time in steps far too large to detect a ~10 Hz oscillation (Wölk & Velden, 1987, p. 63).

Appendix C: Research on Coherence and Cognitive Performance

HeartMath Institute Research

To test our heart rhythm coherence hypothesis, we conducted a study that examined the effect of the psychophysiological coherence mode on cognitive performance. Thirty healthy individuals (13 males, 17 females; age range 26-52, mean age 44) previously screened for their ability to maintain psychophysiological coherence were randomly divided into matched experimental and control groups and stratified by age and gender. We monitored the participants' ECG, pulse transit time, and respiration continuously throughout the experiment. Heart rhythm coherence, derived from the ECG, was calculated for all subjects during each phase of the testing sequence. To determine cognitive performance, we measured participants' reaction times in an auditory discrimination task that requires focus and attention, accurate discrimination, and quick and accurate reactions.

Following a 10-minute baseline period, participants performed the first of two 10-minute auditory discrimination tasks. Then the experimental group was asked to use the Heart Lock-In emotional restructuring technique (Childre & Rozman, 2002) for a 10-minute period, while the control group was instructed to relax for 10 minutes without adopting a specific mental or emotional focus. Immediately following this, all participants performed a second 10-minute auditory discrimination task, the results of which were compared to the first. This enabled us to determine if changes occurred in cognitive performance in either of the two groups and if heart rhythm coherence was related to cognitive performance.

We found, first, that there was a significant increase in heart rhythm coherence ($p < 0.05$) in the experimental group who used the Heart Lock-In technique, but not in the relaxation control group. Furthermore, the experimental group demonstrated a mean decrease of 37 milliseconds in their reaction times—corresponding to a significant ($p < 0.05$) improvement in cognitive performance—whereas the control group showed no change (Figure 12). In addition, there was a significant relationship ($r^2 = 0.21$; $p = 0.015$) between the degree of heart rhythm coherence and performance (reaction time) across all subjects and conditions: increased coherence was associated with decreased reaction times (improved performance). Figure 13 shows a representative example of one participant's heart rhythms during each of the three conditions. Note the development of a more sine-wave-like (coherent) heart rhythm pattern during use of the Heart Lock-In technique. Also noticeable are differences in heart rhythms between the first and second auditory discrimination tasks.

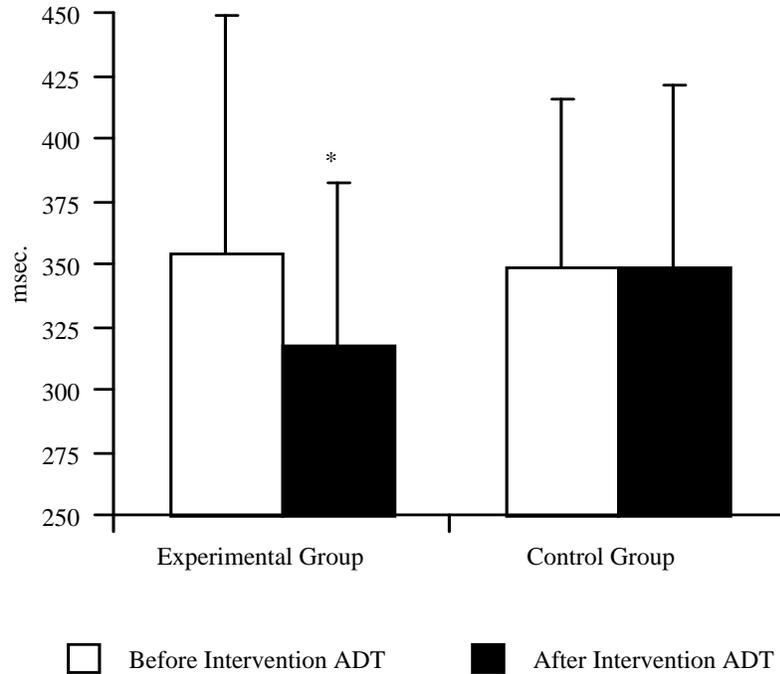


Figure 12. Reaction time changes. Mean reaction times for the experimental versus control group during the first (pre-intervention) and second (post-intervention) auditory discrimination tasks (ADT). The experimental group, who maintained the psychophysiological coherence mode prior to the second ADT, demonstrated a significant reduction in mean reaction time, indicative of improved cognitive performance. In contrast, control group participants, who engaged in an open-focus relaxation period during the interval between tests, showed virtually no change in mean reaction time from the first to the second discrimination task. * $p < 0.05$.

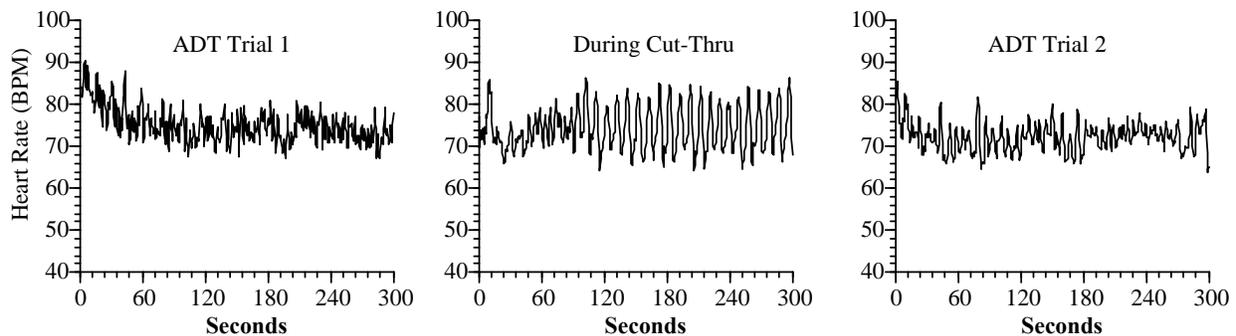


Figure 13. Representative example of heart rhythm pattern changes across conditions from an experimental group participant. Note the development of a coherent heart rhythm pattern during use of the Heart Lock-In technique. Also noticeable are the differences in heart rhythms during the first and second auditory discrimination tasks (ADT).

This experiment demonstrated that cognitive performance can be improved by maintaining psychophysiological coherence prior to a performing a task and that there appears to be a carry-over effect of the coherence mode on subsequent cognitive performance. Importantly, these findings suggest a physiological link between positive emotions and improvements in faculties

such as motor skills, focused attention, and discrimination. More broadly, these results provide evidence for our hypothesis regarding the influence of macro-scale patterns of heart activity—specifically, heart rhythm coherence—on cognitive processes: they suggest that the *overall organization* of the heart’s rhythmic activity, and thus the pattern of cardiac afferent input to the brain, can significantly inhibit or facilitate cortical function.

From the evidence provided by this study, it appears that macro-scale patterns of cardiac activity can produce a larger effect on the inhibition/facilitation of cognitive performance than the much smaller inhibition/facilitation fluctuations in performance observed by Wölk and Velden. As Wölk and Velden proposed, these smaller fluctuations in performance are likely related to the alpha rhythm, which in turn is driven by afferent input from the heart. A relationship between performance and the phase of the alpha cycle has been documented by a number of studies of both visual and auditory perception (Bradford, Wesnes, & Brett, 2005; Callaway, 1962; Childre & Cryer, 2000; Dustman & Beck, 1965; Nunn & Osselton, 1974; Rice & Hagstrom, 1989). For those studies that used a reaction-time protocol, the *maximum* reported magnitude of these small fluctuations in reaction time (i.e., the difference between fastest and slowest phases) was 6.3 milliseconds (Dustman & Beck). Compared to the results of these studies, our research found an approximately *six times* greater improvement in performance (a mean improvement of 37 milliseconds in reaction time) after the study participants maintained a state of psychophysiological coherence. It is thus likely that heart–brain interactions occurring on a much longer time scale have a markedly larger impact on cognitive performance and intentional behavior. Seen from this viewpoint, the small-magnitude fluctuations in performance observed by Wölk and Velden may reflect the ongoing background behavior of the system.

UK Research

Additional evidence consistent with the heart rhythm coherence hypothesis has been provided by an independent study conducted in the UK by Dr. Keith Wesnes at Cognitive Drug Research Ltd. (Wesnes, Ward, McGinty, & Petrini, 2000). To test the long-term effects of psychophysiological coherence on cognitive performance, Dr. Wesnes used a comprehensive battery of cognitive performance tests called the Cognitive Drug Research measurement system (CDR), designed to assess the effects of pharmaceuticals on cognitive function. The CDR system is a set of computer-based tasks that includes tests of attention, concentration, vigilance, short-term (working) memory and long-term (episodic) memory. This battery of tests has been used in clinical trials worldwide for over 20 years, and an extensive database of normal performance and drug placebo effects has been developed.

The study utilized an experimental design with pre and post measures. Eighteen healthy volunteers (6 females, 12 males; age range 20-53, mean age 32 years) were recruited for the study. The study participants were fully trained on the CDR system and completed four full runs through the assessment prior to the baseline data collection in order to ensure they understood the tasks and had overcome the learning process. To measure heart rate variability and heart rhythm coherence, each research participant’s ECG was recorded for a 10-minute period *prior* to administration of the CDR test battery. In addition, participants completed a short self-administered questionnaire that measured calmness and alertness.

After collection of the baseline measures, the study participants attended a one-day training program where they learned the Freeze-Frame, Heart Lock-In, and Coherent Communication²³ techniques. They also practiced using these tools while facilitated by the Freeze-Framer, a computerized heart rhythm coherence biometric feedback system, to ensure they were making the shift into the coherence state and could identify what that state felt like. They were instructed to use the Freeze-Frame technique whenever they experienced stress or emotional discord, and to use the Heart Lock-In technique three times per week for at least 10 minutes. In addition, they were encouraged to practice using the Coherent Communication technique when engaged in conversation with others.

Seven weeks later the research participants were again administered a 10-minute ECG, answered the questionnaire, and completed the CDR battery of tests using exactly the same protocol as was followed for baseline data collection.

For data analysis, the standard time and frequency domain HRV measures and coherence levels were computed. The pre and post results are shown in Table 1 and Figure 14. In relation to baseline measurement, a significant increase in heart rhythm coherence (Coherence: t -test 4.00, $p < 0.001$) was observed post-intervention before the participants were administered the CDR tests. This change is graphically depicted in Figure 14 (showing the group mean HRV power spectra), where the increase in power around the 0.1 Hz frequency range indicates a pronounced increase in heart rhythm coherence. It is worth noting that this increase in heart rhythm coherence occurred even though the participants were not specifically instructed to use any of the tools they had learned in the program.

²³ This technique incorporates a process whereby individuals maintain a state of coherence while listening to others in order to increase the effectiveness of communication (Lansing, 1957).

Table 1. CDR Cognitive Performance Study: Pre and Post Results

	Before (N=18)			After (N=18)			t	p <
	Mean	SD	SEM	Mean	SD	SEM		
Quality of Episodic Memory	227.87	63.24	14.90	256.58	76.45	18.02	3.23	0.01
Quality of Working Memory	1.74	0.22	0.05	1.78	0.18	0.04	1.87	ns
Self-Rated Alertness	53.29	12.09	2.85	57.64	8.98	2.12	2.02	ns
Self-Rated Calmness	49.33	7.11	1.68	55.11	10.44	2.46	2.44	0.05
Systolic BP, mmHg	122.50	16.22	3.82	123.64	13.97	3.29	0.49	ns
Mean RR interval, ms	797.65	81.03	19.10	825.44	103.38	24.37	1.02	ns
Mean heart rate, BPM	76.40	7.32	1.72	74.61	9.20	2.17		
Standard deviation of RR intervals, ms	57.59	20.12	4.74	79.65	28.10	6.62	3.97	0.001
5-min High frequency, ms ²	298.21	267.37	63.02	246.39	221.68	52.25		
Ln(5-min High frequency)	5.21	1.16	0.27	5.05	1.00	0.24	-0.69	ns
5-min Low frequency, ms ²	550.73	676.65	159.49	1841.62	1587.90	374.27		
Ln(5-min Low frequency)	5.80	0.99	0.23	6.98	1.18	0.28	3.91	0.01
5-min Very low frequency, ms ²	427.97	442.10	104.21	414.03	312.56	73.67		
Ln(5-min Very low frequency)	5.69	0.78	0.18	5.72	0.66	0.16	0.15	ns
5-min Total power, ms ²	1294.70	1032.73	243.42	2516.76	1727.81	407.25		
Ln(5-min Total power)	6.85	0.83	0.20	7.51	0.88	0.21	3.59	0.01
Coherence	0.13	0.19	0.05	6.49	7.96	1.88		
Ln(Coherence)	-2.84	1.14	0.27	-0.15	2.52	0.59	4.00	0.001
Low frequency / high frequency ratio	3.20	4.23	1.00	11.92	9.36	2.21		
Ln(Low frequency / high frequency ratio)	0.58	0.99	0.23	1.92	1.17	0.28	3.49	0.01

Paired T-Test

Group Mean HRV Power Spectra

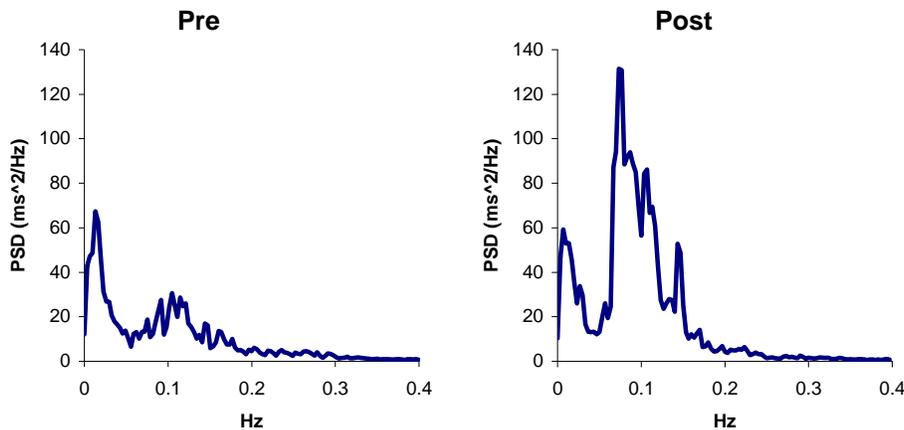


Figure 14. Group mean HRV power spectra calculated from 10-minute ECGs recorded before subjects completed the battery of cognitive performance tasks. The left-hand graph shows the mean HRV power spectrum before subjects were trained in the HeartMath coherence-building techniques, while the right-hand graph shows the mean power spectrum after they learned and practiced the techniques for seven weeks. Note the increase in power around the 0.1 Hz frequency range, indicating a pronounced increase in heart rhythm coherence. This shift is particularly notable, as subjects were not specifically instructed to use the techniques during the “post” recording.

The results of the pre and post analysis of the cognitive performance tests showed a significant improvement ($p = 0.0049$) in the quality of episodic (long-term) memory and a marginally significant improvement ($p = 0.078$) in the quality of working (short-term) memory (Figure 15).²⁴ ²⁵ Analysis of the questionnaire data also showed that the research subjects reported feeling significantly calmer at the end of the study than they did at the beginning (t -test 2.44, $p < 0.05$).

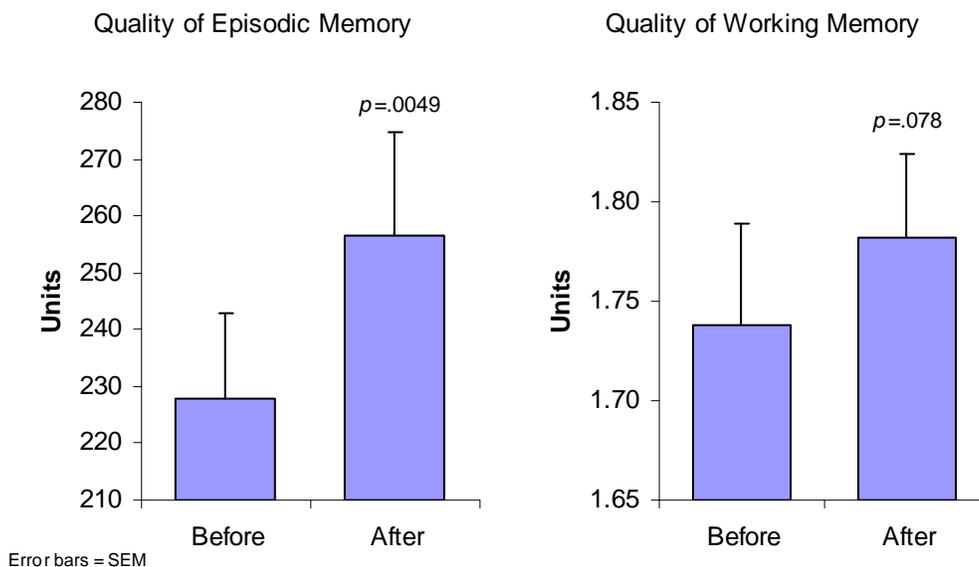


Figure 15. Mean improvements in quality of episodic (long-term) memory and quality of working (short-term) memory after practicing the HeartMath coherence-building tools for a 7-week period.

The finding of the observed gain of 12.6% in the quality of long-term memory over the 7-week period during which coherence-building techniques were practiced is notable, in that Dr. Wesnes reports the magnitude of improvement was significantly higher than the improvement in quality of memory obtained in a large clinical 14-week trial of the effects of a phytopharmaceutical memory enhancer (a ginkgo/ginseng combination) on the memory of healthy volunteers (Wesnes et al., 2000).

In an effort to explain the observed pre-post changes in the quality of episodic memory and in self-rated calmness, two stepwise multiple regressions were run. Of the ten independent variables included in each analysis, improvement in coherence was the only variable with sufficient statistical power to meet the criterion for entry into the stepwise analysis (p of F to enter = 0.05;

²⁴ Quality of Episodic Memory is a composite measure constructed from accuracy measures on the four tests in the CDR system that assess episodic memory. Quality of Working Memory is a composite measure constructed from accuracy measures on the two CDR system tests that assess working memory.

²⁵ Also observed was a positive trend in the composite scores reflecting the ability of the participants to pay attention and the speed with which they were able to retrieve information from memory. However, the improvements in these measures did not reach statistical significance.

p of F to remove = 0.10).²⁶ The results show that the change in coherence is quite strongly related to the observed changes in episodic memory and calmness: it accounts for 21% of the variance in the improvement in long-term memory ($F = 5.4$, $p < 0.05$; adj. $R^2 = 0.21$), and it accounts for 42% of the variance in the reported increase in calmness ($F = 13.18$, $p < 0.01$; adj. $R^2 = 0.42$).

In his review of the study's results, Dr. Wesnes concluded that learning and practicing the HeartMath positive emotion-focused coherence-building techniques appears to enhance an individual's memory capacity and also improves self-reported calmness. Moreover, he was able to show that the improvements were unlikely to be due to training or expectation effects, and that they compare favourably to the improvements produced by a proven phytopharmaceutical preparation.

HeartMath's TestEdge Program on Test Anxiety and Performance

Further support for the heart rhythm coherence hypothesis comes from a controlled field study, funded by U.S. Department of Education, involving tenth grade students in two large California high schools. Conducted by the Institute of HeartMath in collaboration with Claremont Graduate University's School of Educational Studies in 2004-2006, the study was designed to assess the efficacy of HeartMath's TestEdge program as a means of reducing student test anxiety and improving learning and test performance. The TestEdge program is designed to help students alleviate emotional stress and improve performance by teaching them tools enabling them to stabilize emotions and generate the psychophysiological coherence state. The program instructs students in how to apply HeartMath coherence-building tools and technologies in test preparation, to increase retention and relevance of academic material, and to more effectively handle stress and challenges, both at school and at home.

After random selection of the intervention school, the experimental protocol required training the school's tenth grade teachers in the tools and techniques of the TestEdge program before classes started. Once school began, the teachers trained and coached their students in the coherence-building techniques throughout the term. The Freeze-Framer heart rhythm coherence feedback system was used to facilitate students' practice of the techniques and to verify their attainment of the coherence state. Students practiced using the tools during stressful situations, such as prior to taking tests or when learning new or difficult subject matter, before taking the California High School Exit Exam (CAHSEE) midway through the term and the California Standards Test (CST) at the end of the school term.

Scores from the two standardized tests, and pre and post data from an instrument designed to measure student sociodemographic characteristics, attitudes about school, perceptions of feelings, emotions, relationships, and test anxiety (using an eight-item version of the Spielberger Test Anxiety Inventory) were collected from 749 tenth grade students across both schools.

²⁶ Excluded variables were Change in: Systolic Blood Pressure, Mean RR Interval, Standard Deviation of RR Intervals, Ln(5-min High Frequency), Ln(5-min Low Frequency), Ln(5-min Very Low Frequency), Ln(5-min Total Power), Ln(Low Frequency / High Frequency Ratio) and Baseline Age.

Additionally, to assess students’ ability to generate the coherence state using the techniques learned in the program, an electrophysiological study was conducted in which pre- and post-intervention recordings of HRV were obtained from a subgroup of students in both schools.

Figure 16 shows, for the whole sample, the relationship between baseline test anxiety and the CAHSEE Math and English-Language Arts test scores. Clearly apparent is the inverse relationship between stress and academic performance, as measured by the Test Anxiety Inventory (TAI) and the two standardized tests.

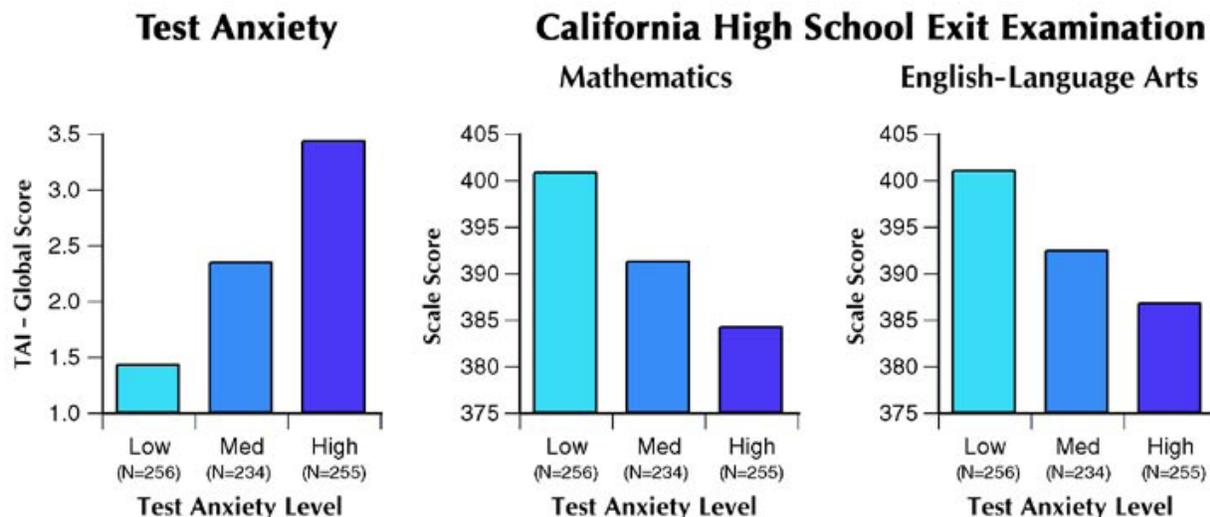


Figure 16. California High School Exit Exam scores by baseline test anxiety level. Baseline test anxiety, measured by the Test Anxiety Inventory (TAI)-Global Scale score, and mid-term CAHSEE–Mathematics and CAHSEE–English-Language Arts scores have each been classified into approximately equal-size tertile groupings of students with low, medium, and high mean scores. A strong, statistically significant ($p < 0.001$), negative relationship is clearly apparent between test anxiety level and level of performance on the two standardized tests.

Results from an analysis of a subsample of students at the end of the study present quite a different picture following the HeartMath intervention (see Figure 17). Students were matched by their ninth grade CST Math test type and were selected from classes in the two schools with similar class average scores. An ANCOVA was then performed to control for baseline differences between the schools on the dependent variable—test performance. The post-intervention mean tenth grade CST Math test score for the students in both schools was closely matched (359.71 versus 360.58, $p = 0.891$, not significantly different). What is notable, when intellectual ability is controlled in this way, is that the post-intervention mean test score in tenth grade CST English-Language Arts is significantly higher for the intervention school—by a margin of approximately 10 points—than it is for the control school (413.44 versus 402.96, $p = 0.035$). Moreover, this improvement in test performance is associated with a significant reduction of test anxiety in the intervention school relative to the control school (1.99 versus 2.22, $p < 0.05$).

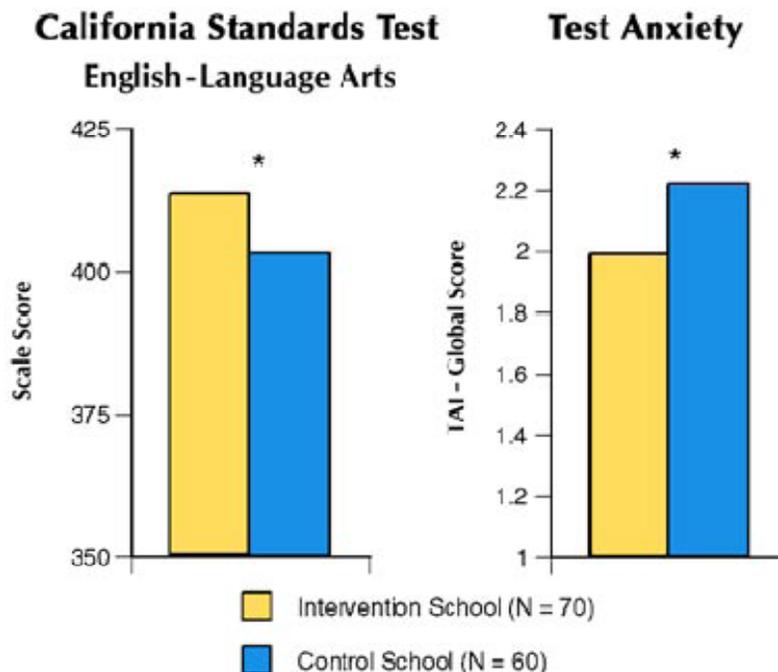


Figure 17. Test anxiety and California Standards Test scores by intervention status. Data from a subsample of students (matched on ninth grade CST–Mathematics test type and selected from classes with comparable mean scores), showing post-intervention results from an ANCOVA in which means have been adjusted for baseline differences. * $p < 0.05$.

However, a key question of inference, in interpreting these results, concerns the degree to which the HeartMath intervention actually resulted in the expected physiological changes in heart rhythm coherence in students, and the degree to which coherence is associated with their self-reports of reduced test anxiety over the course of the study. Corroborating evidence comes from the electrophysiological sub-study involving a random sample of students from both schools, stratified by test anxiety level and gender. In this sub-study, to simulate a stressful testing situation, students completed an experimental procedure that included a computerized version of the Stroop color-word conflict test (a standard protocol used to induce psychological stress), while continuous HRV recordings were gathered. During the pre-intervention administration, students were asked to prepare themselves to take the test using whatever methods they typically used when preparing to perform a challenging test or activity. In the post-intervention session, students in the intervention group were instructed to use one of the positive emotion-focused coherence-building techniques they had learned in the TestEdge program to ready themselves for the test, while the control group students again used their own methods. This was done in an effort to document, with objective electrophysiological measures, that students in the intervention school had learned how to self-induce the coherence state prior to taking a stressful test.

Results reveal a significant increase in heart rhythm coherence for students in the intervention school, indicating they were less stressed, which is consistent with the expected outcome. Overall, the results from the physiological study present compelling objective evidence that the students in the experimental group had learned how to shift into the coherent state and better

manage their emotions when preparing for a stressful task or situation, such as taking an important test.

Beginning with an analysis of pre-intervention recordings, we found no significant differences between the two schools—either during the baseline resting period or during the stress preparation period. We then performed an ANCOVA in which post-intervention heart rhythm coherence was defined as the dependent variable and pre-intervention heart rhythm coherence was defined as the covariate; intervention status was designated as the fixed factor. We found a significant difference ($p < 0.001$) in post-intervention heart rhythm coherence between the two groups of students during the test preparation phase of the protocol. As graphically depicted in Figure 18, a notable increase in mean heart rhythm coherence is observed in the intervention group (3.26 pre-intervention, 4.53 post-intervention), whereas a reduction is evident in the control group (3.16 and 2.83, respectively). The intervention group in this sub-study also registered a significant pre–post reduction in test anxiety as compared to the control group (1.98 versus 2.27, $p < 0.01$).

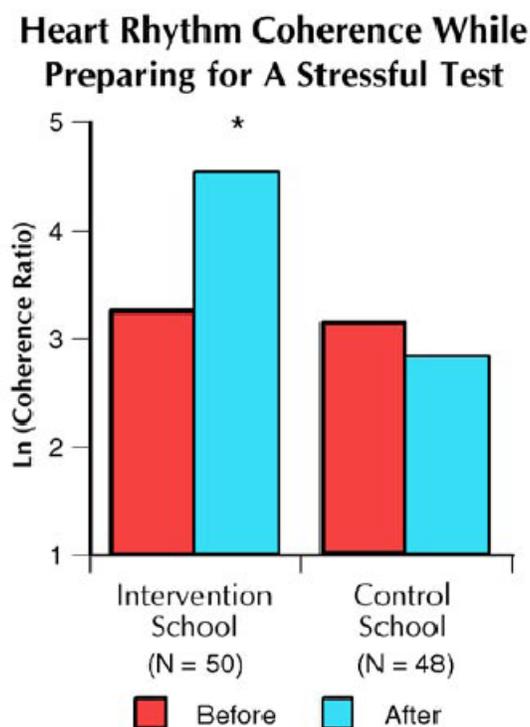


Figure 18. Heart rhythm coherence while preparing for a stressful test. Data are shown from the electrophysiological sub-study, in which a stratified random sample of students from the intervention and control schools was administered the Stroop stress test in a controlled experiment, while heart rate variability was continuously recorded. These graphs quantify heart rhythm coherence during the stress preparation phase of the protocol, before and after the TestEdge intervention. The intervention group demonstrated a significant increase in heart rhythm coherence in the post-intervention recording, when they used a HeartMath positive emotion-focused technique to prepare for the stressful test, as compared to the control group, who used their own usual stress preparation methods. * $p < 0.05$.

Figure 19 presents examples of typical patterns observed in the HRV recordings collected during the stress preparation phase of the electrophysiological sub-study, pre- and post-intervention. Shown are examples from four students (two from the intervention group and two from the control group), who are also in the subsample matched on ninth grade CST Math test type. Pre- and post-intervention test anxiety and CST–English-Language Arts test score data are also shown for each student. For the students in the intervention school, the pre-intervention HRV pattern while preparing to take the Stroop stress test is highly erratic and irregular, suggesting an enduring state of psychophysiological incoherence. However, in these students' post-intervention HRV recordings, a marked shift to increased heart rhythm coherence in the stress preparation period is readily apparent. This suggests that students were able to self-generate a state of psychophysiological coherence by applying the positive emotion-focused technique to prepare for a stressful test. By contrast, both the pre and post HRV recordings for the students in the control school signify an ongoing incoherent psychophysiological state during the stress preparation phase. Interestingly, these examples also show that the students who learned to generate psychophysiological coherence demonstrated a corresponding reduction in test anxiety and an increase in academic test scores, while the control group students experienced an increase in test anxiety and reduced academic test performance.

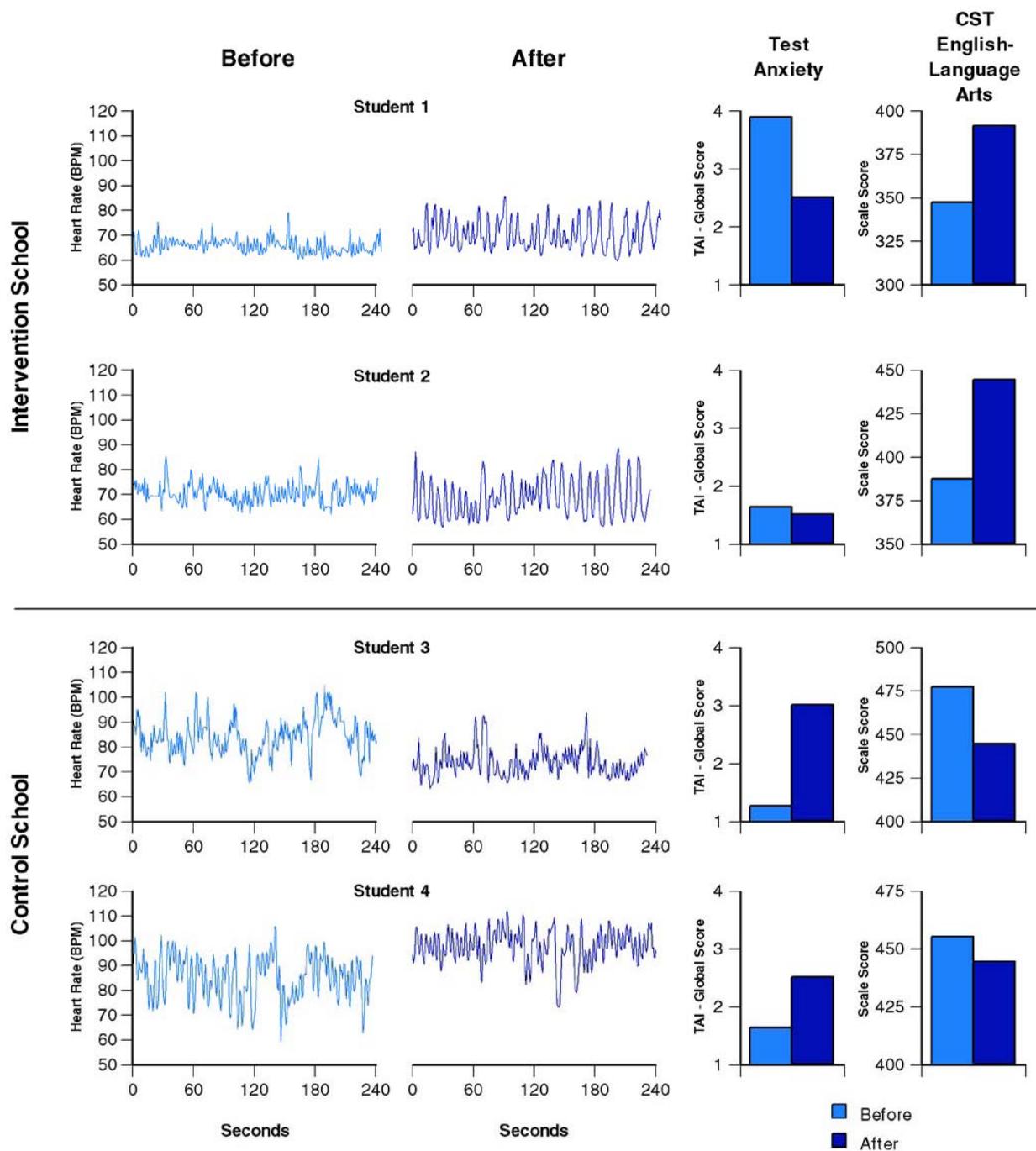


Figure 19. Typical heart rate variability patterns in students preparing for a stressful test. HRV recordings from the electrophysiological study, showing four students’ heart rhythm patterns while they prepared themselves for the Stroop stress test, both before and after the TestEdge intervention. Pre- and post-intervention test anxiety level (TAI-Global Scale score) and the CST–English Language Arts test score for each student are also shown. For the two students in the intervention school, the recordings show a shift from an erratic, irregular heart rhythm pattern (left-hand side), signaling a state of psychophysiological incoherence before the intervention, to a sustained sine-wave-like pattern (increased heart rhythm coherence), indicative of the psychophysiological coherence state after the intervention. By contrast, both the pre and

post HRV recordings for the two students in the control school signify an ongoing incoherent psychophysiological state.

In sum, the results show that high school students can be trained to self-generate heart rhythm coherence and that they are able to effectively apply this skill prior to taking a challenging or stressful test. The data suggest that when students self-manage their stress using coherence-building methods, it enables them to achieve both a significant reduction in testing-related anxiety and a corresponding improvement in standardized test scores—a real-world measure of cognitive performance.

Appendix D: Heart Brain Synchronization

As noted in our earlier discussion, central to Wölk and Velden's hypothesis regarding the heart's influence on cognitive performance is a key untested postulate: that the brain's alpha rhythm is synchronized to the cardiac cycle. Independently of Wölk and Velden's work, we had been pursuing the question of the synchronization of heart and brain activity, which, so far as we know, had not been previously quantified. Here we present evidence from two studies conducted in our laboratory which confirm that a significant amount of alpha rhythm activity is indeed synchronized to the activity of the heart. The findings from these studies confirm Wölk and Velden's ideas and offer further evidence that broadens the understanding of heart-brain synchronization.

In our research we used heartbeat evoked potential analysis to examine the distribution of EEG activity that is synchronized to the cardiac cycle. Heartbeat evoked potential analysis involves the use of signal averaging techniques²⁷ to trace the flow and processing of afferent neurological signals from the heart through the different regions of the brain. The resulting waveforms, which represent EEG (brain) activity that is time-locked to the ECG (heart activity), are called *heartbeat evoked potentials*. The peak of the ECG R-wave is used as the timing source for the signal averaging process. An example is depicted in Figure 20. Here, in each of the EEG signal averaged waveforms, a peak can be seen that is aligned with the R-wave of the ECG. This peak reflects energetic and volume conduction mechanisms, while the later potentials reflect the processing of the afferent signals and the effects of the blood pressure wave reaching the different areas of the brain.

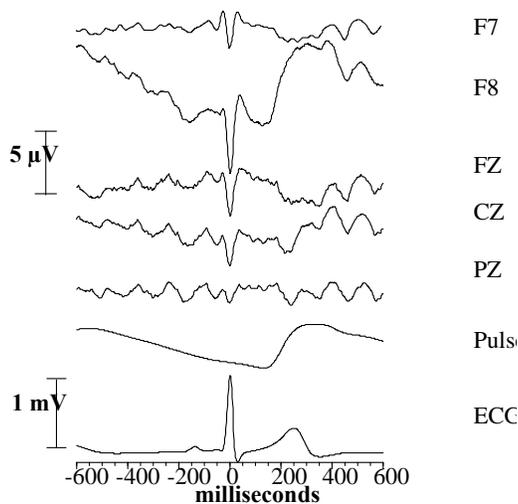


Figure 20. Heartbeat evoked potentials. This figure shows an example of typical heartbeat evoked potential waveforms along the medial line of the scalp (Fz, Cz, and Pz) and the frontal

²⁷ Signal averaging is a technique for detecting patterns in biological and bioelectromagnetic phenomena. This is accomplished by superimposing any number of equal-length epochs, each of which contains a repeating periodic signal. This procedure distinguishes any signal that is time-locked to the periodic signal while eliminating variations that are not time-locked to the periodic signal.

area (F7 and F8). The electromagnetic and volume conduction effects of the electrical activity of the heart can clearly be seen in the waveforms (large negative-going peaks occurring exactly in sync with the ECG R-wave). In this example, there is less synchronized activity in the brain potentials immediately after the ECG R-wave, indicating the processing of afferent information. The pulse wave is also shown, indicating when the blood pressure wave reached the brain. Increased alpha synchronization can be clearly seen later in the waveforms, around 250 milliseconds post R-wave, which is the time the blood pressure wave reaches the brain.

In the first study, the ratio of alpha–ECG synchronization was compared at baseline and during the psychophysiological coherence mode in ten participants. EEG recordings using electrodes along the midline (Oz, Pz, Cz, Fz) and the lateral frontal sites (F7, F8) were obtained from the research participants. Heartbeat evoked potentials were obtained using a 200-sweep-wide window that was moved across the first 10 minutes of the recording for each condition for each participant. Figure 21 shows an example of one heartbeat evoked potential waveform with the presence of the alpha rhythm. The two time intervals between 50-250 milliseconds (period 1) and 250-600 milliseconds (period 2) post R-wave were each subjected to a separate spectral analysis in which the spectral amplitude in the 8–12 Hz region was calculated for each sweep average.

The first period of the heartbeat evoked potential (50-250 milliseconds post R-wave) is the time interval when afferent signals from the heart reach the lower brain areas. It was observed that there were substantial individual differences between participants in this region. The main difference appeared to be that in about half the participants there was a desynchronization of the alpha rhythm, indicating an increase in the processing of the afferent information, while in others there was increased alpha synchronization.

The second period of the heartbeat evoked potential (250-600 milliseconds post R-wave) is believed to reflect the higher cognitive centers' processing of the sensory input and is also within the time interval when the blood pressure wave reaches the brain. Substantial individual differences were observed in this period as well. The main differences were in the later part of the evoked potentials and were observed primarily in the frontal regions of the brain. In the lower brain regions, the arrival of the blood pressure wave appears to mask the processing of some of the cardiovascular afferent information. This masking is a result of the impact of the arrival of the blood pressure wave having an additional effect on synchronizing brain activity to the heart. Therefore, the 250–600 millisecond region of the evoked potential appears to primarily reflect synchronized activity due to biophysical interaction of the blood pressure wave with the brain. This finding clearly supports Wölk and Velden's hypothesis and it is consistent with their findings of an increase in the amplitude of the performance oscillations starting around 300 milliseconds after the R-wave (see Figure 11).

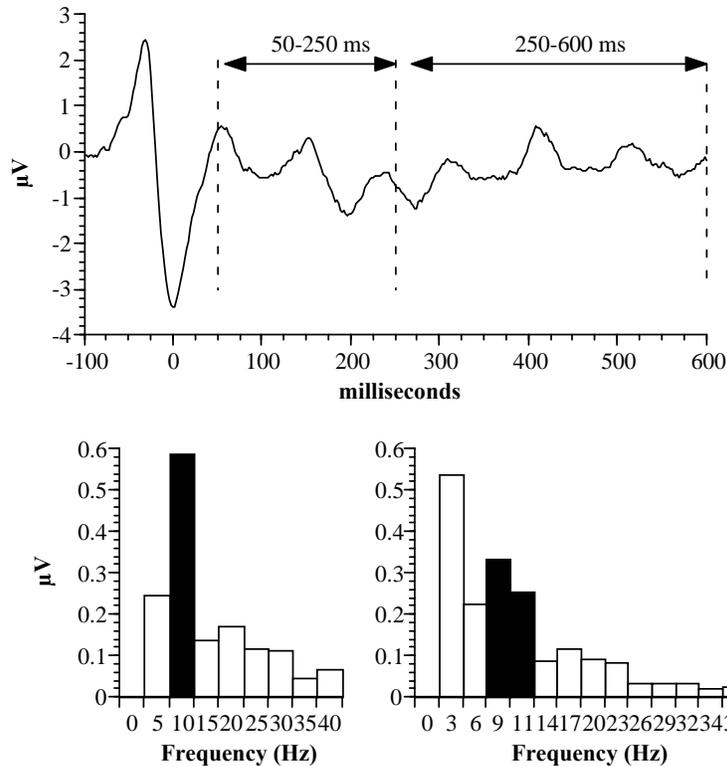


Figure 21. Quantification of alpha rhythm–ECG synchronization. In order to quantify the amount of alpha activity that is synchronized to the heart, a spectral analysis of the heartbeat evoked potential waveforms is performed. In this example the waveform is divided into two segments that represent different physiological mechanisms. The segment between 50–250 milliseconds reflects the processing of afferent signals, while the segment between 250–600 milliseconds reflects a combination of afferent processing and effects of the blood pressure wave reaching the brain.

Because of the prevalence of the alpha rhythm in EEG recordings, in determining the degree of alpha–ECG synchronization it is important to distinguish measurement of alpha activity that is truly synchronized to the cardiac cycle and spurious measurement in which alpha activity is only coincidentally synchronized to the heart. To control for the effects of this potential measurement artifact, the same procedure described above was repeated using the same ECG as the signal source, but with the interbeat intervals randomized.

As shown in Figure 22, there was significantly more alpha rhythm synchronization when the actual interbeat intervals were used for the signal source as compared to the randomized controls. This finding, too, is consistent with the idea underlying Wölk and Velden’s postulate.

In addition to the alpha–ECG synchronization observed, this study found that a significant amount of lower frequency brain activity (< 8 Hz) was also synchronized to the cardiac cycle (Figure 23).²⁸

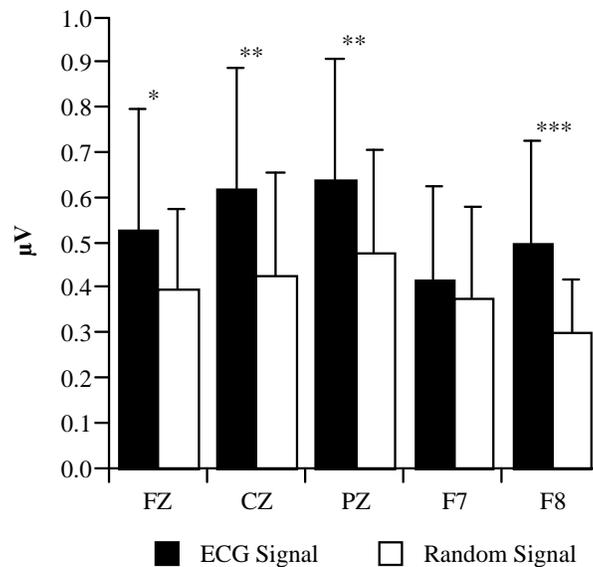


Figure 22. Alpha rhythm–ECG synchronization. This figure shows the alpha band spectral magnitude derived from the heartbeat evoked potential waveforms at different EEG sites in the range from 50–600 milliseconds post R-wave. It also compares the spectral magnitude of the real ECG as the signal source to a randomized control signal having the same mean interbeat interval and standard deviation as the original ECG signal. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

²⁸ Because the time window in the EEG record post R-wave is only 600 milliseconds long, there is not enough time to adequately resolve these lower frequencies with spectral analysis. However, the amount of synchronized activity in the EEG at these lower frequencies can be quantified by comparing the standard deviations of the evoked potential waveforms to those of the randomly generated control signals.

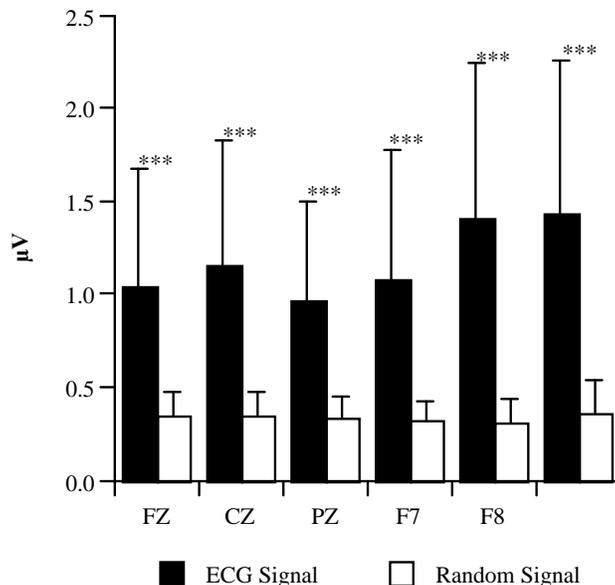


Figure 23. Low frequency synchronization. The standard deviation of the evoked potential waveforms in the range between 50–600 milliseconds was used to quantify the lower-frequency activity in the EEG that is synchronized to the cardiac cycle. The ECG and a randomized control signal for dividing the signals into segments were compared. There was a significant difference at all EEG sites, with the ECG signal resulting in higher standard deviation values. This indicates a significant synchronization of low frequency brain activity to the heart. *** $p < 0.001$.

Given our previous findings on the effect of psychophysiological coherence in increasing the synchronization among multiple body systems, we wondered whether this mode was also related to a change in heart–brain synchronization—specifically if ECG–alpha synchronization would increase as well. To determine if the ratio of ECG–alpha synchronization increased when participants were in the psychophysiological coherence mode, the study participants were asked to use the Heart Lock-In technique for 10 minutes after a 10-minute baseline period had been recorded. The degree of heart rhythm coherence and the alpha rhythm magnitude in the heartbeat evoked potentials during these two conditions were then compared.

During the period that the subjects used the Heart Lock-In technique, significant increases in heart rhythm coherence and in ECG–alpha synchronization were observed, as shown in Figure 24. Under this condition, there were significant increases in synchronized alpha activity at most sites in the range between 50–250 milliseconds, while in the 250–600 millisecond range there was a significant increase only at the Fz (midline frontal) location.

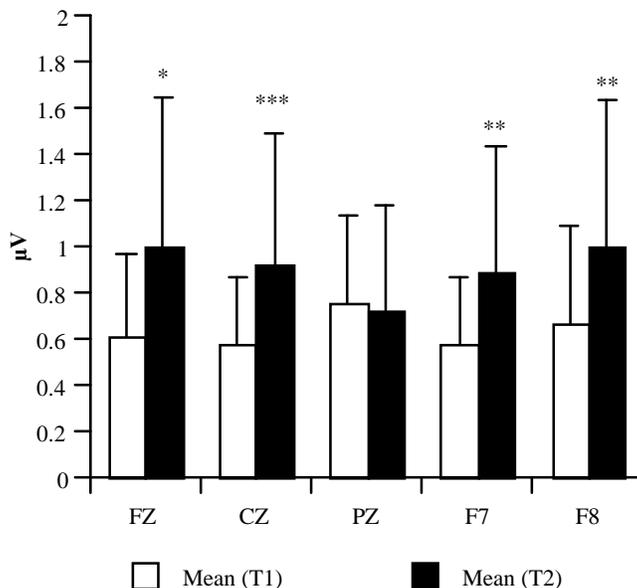


Figure 24. Increase in alpha rhythm–ECG synchronization during heart rhythm coherence. There was a significant increase in alpha wave synchronization to the ECG in the 50–250 millisecond region at most EEG sites during the use of the Heart Lock-In technique (high heart rhythm coherence). T1 = resting baseline; T2 = during heart rhythm coherence. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In a second study we recorded 19 channels of the EEG from 30 participants, who were measured in both baseline and psychophysiological coherence modes. The research participants used the Heart Lock-In technique to enter the psychophysiological coherence mode by self-generating feelings of appreciation as they listened to music designed to foster positive emotions (Childre, 1991). Relative to baseline values, we found both a significant increase in heart rhythm coherence in the psychophysiological coherence condition and also a significant increase in the percentage of ECG–alpha synchronization in the left hemisphere, centered around the temporal lobe.

Figure 25 shows the whole group mean topographical maps of the percentage of alpha activity that was synchronized to the heartbeat during the resting baseline and coherence modes. The plots are controlled for total amount of alpha activity (synchronized alpha/total alpha), which did not change significantly, and show only the amount of synchronized activity. As can be seen, the areas with the highest degree of synchronization shift from the right frontal area during the baseline period to the left hemisphere, centered around the temporal area and radiating outward from there during coherence. While this change was most pronounced at EEG site T3 (left temporal area), the activity at adjacent sites was also significantly more synchronized to the heart during the psychophysiological coherence mode.²⁹

²⁹ It is of interest to note that these observations are related to findings indicating that increased left hemisphere activity is associated with happiness and euphoria (Ahern & Schwartz, 1985; Canli et al., 1998; Davidson, 1992). It is clear that both the right and left hemispheres are involved in the processing

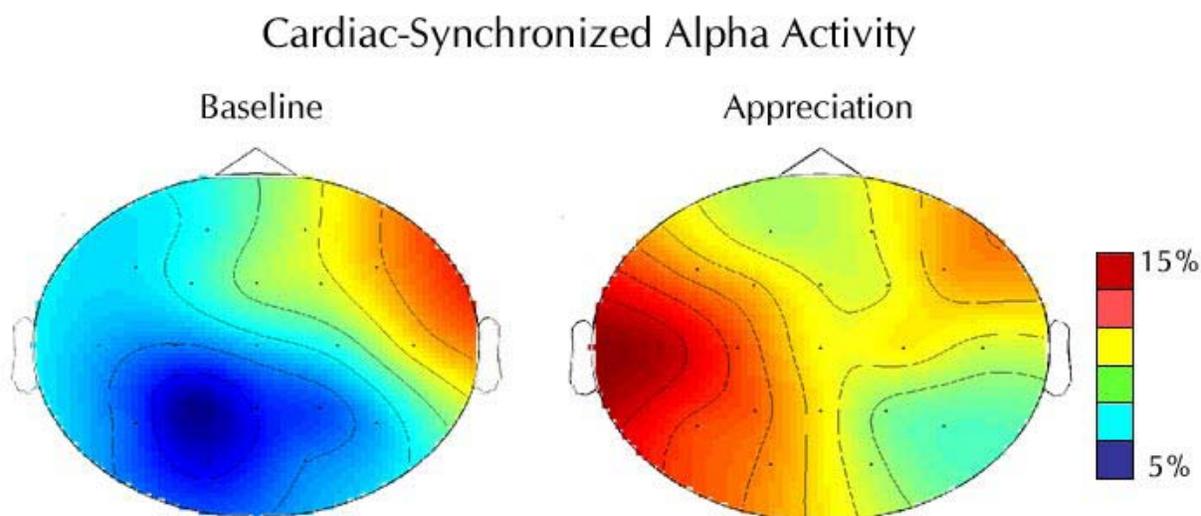


Figure 25. Alpha activity synchronized to the cardiac cycle. Group mean topographical maps for 30 subjects, showing the percentage of alpha activity in different regions of the brain that is synchronized to the heartbeat during a resting baseline as compared to during actively feeling appreciation (psychophysiological coherence mode).

To determine if there were gender differences in the amount and distribution of the EEG activity synchronized to the heart, we performed an analysis of baseline data by gender for both the alpha and beta rhythms. Figure 26 is a topographic map showing the magnitude and distribution of the alpha rhythm synchronized to the heart over the entire scalp for both males and females under baseline conditions. The females have more synchronized alpha activity in the frontal areas, while the males have more synchronized alpha in the parietal areas. Figure 27 shows the data from the same participants for the beta rhythm. The data from the beta rhythm analysis also shows a distinctive distribution pattern of synchronized activity to the heart. The females in this sample had significantly more background beta activity than the males, and, as can be seen in the topographic maps, the beta rhythm is more synchronized in the frontal regions.

and regulation of emotion; however, there is still a lack of clarity regarding the roles of hemispheres and how they interact in the emergence and perception of emotional experience.

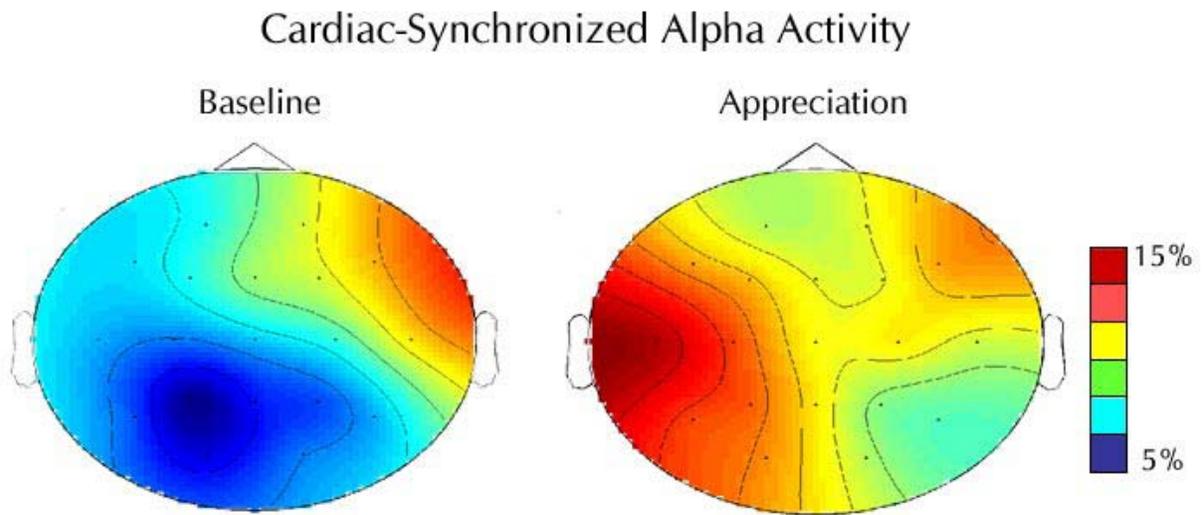


Figure 26. Alpha activity synchronized to the cardiac cycle. Group mean topographical maps for male and female participants showing the distribution of alpha activity that is synchronized to the heartbeat during a resting baseline period.

Cardiac-Synchronized Alpha Frequency Spectrum Distribution

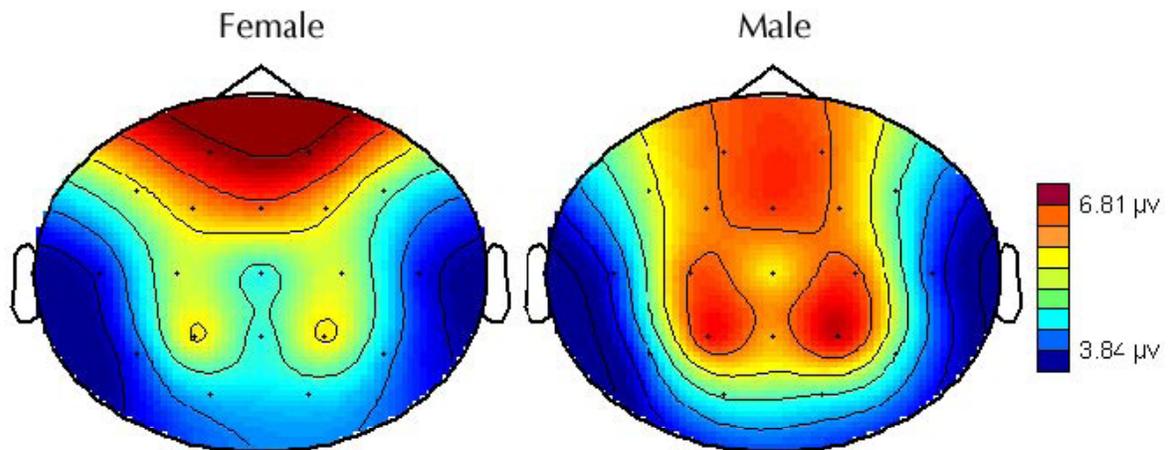


Figure 27. Beta activity synchronized to the cardiac cycle. Group mean topographical maps for male and female participants showing the distribution of beta activity that is synchronized to the heartbeat during a resting baseline period.

Appendix E: Energetic Signatures of Psychophysiological Modes

Figures 28 through 33 show waterfall plots of consecutive amplitude spectra from the ECG data used to produce the examples of the six different psychophysiological modes described at the outset of this article: Mental Focus, Psychophysiological Incoherence (anger), Relaxation, Psychophysiological Coherence (appreciation), Extreme Negative Emotion (intense anger), and Emotional Quiescence. Each trace in the waterfall plots is the spectrum of the actual electrocardiogram recording of an individual over a 6-second period. (These spectra should not be confused with the power spectra of the HRV waveforms, such as those shown earlier in this article.) Together, the set of traces recorded cover a continuous time period (approximately 2 ½ minutes) and show the degree of stability in the structure of the waves of electrical activity generated by the heart during this time. As can be seen, although there are commonalities across the modes, there are also *distinctive spectral patterns* associated with each specific mode.

There is a direct relationship between the heart rhythm patterns (HRV) and the spectral information encoded in these radiating fields. This is due to the fact that the distribution of the harmonic relationships and magnitudes of the various peaks in the ECG spectrum are dependent on the length of the interbeat intervals (the temporal space between consecutive heartbeat spikes) and the distribution pattern of the interbeat intervals within the heart rate series (heart rhythm patterns). This relationship between the heart rhythm pattern and the ECG spectral patterns will be discussed in more detail as we describe the energetic signature of each psychophysiological mode.

The waterfall plots of the ECG spectra shown in Figures 28 through 33 were all derived from the same recordings of ECG signals that were used to measure the heart rhythms and the HRV spectra of those heart rhythms shown in Figure 8. Our interest in reviewing these spectra is to highlight the distinctive energetic features of each mode. For certain modes these features are readily apparent, while for others they are more subtle.

Mental Focus

Figure 28 shows the waterfall plot of the ECG spectra for the Mental Focus mode. Referring back to Figure 8, the heart rhythm pattern for this mode showed an overall suppression of HRV, with a slight increase in heart rate over the session. The lowered HRV produces an ECG spectrum that has a series of harmonics extending out to approximately 25 Hz. The lower the HRV (that is, the more uniform the time interval between each consecutive heartbeat), the more standing waves emerge and are organized in a harmonic order in the ECG spectrum (see Extreme Negative Emotion and Emotional Quiescence for examples). There are also two sets of peaks that occur in most of the individual spectra in the range of 3–5 Hz and 7–8 Hz. These peaks are due to the low frequency rhythm (~10-second rhythm) that occurs in the heart rhythm pattern. The presence of this rhythm during the Mental Focus mode can be seen in the HRV spectrum shown in Figure 8. However, it is not as prominent as it is in the Relaxation mode, nor is it the main rhythm, as in the Coherence mode (appreciation).

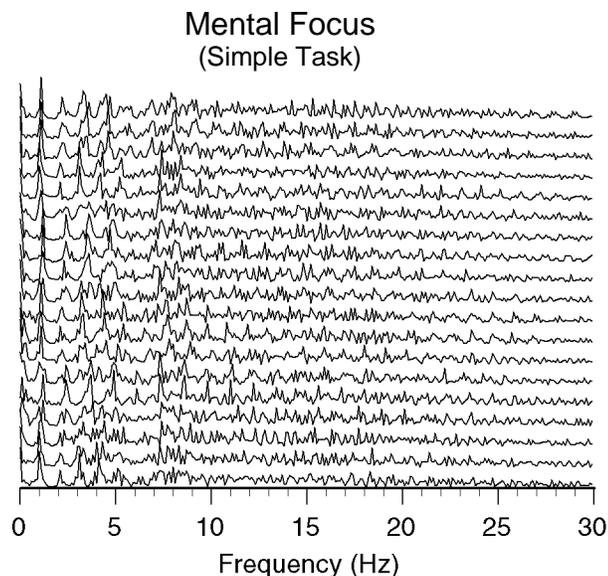


Figure 28. Waterfall plot of ECG spectra for the Mental Focus mode. Relative to a “normal” waking state, there is less amplitude in the spectral peaks during Mental Focus due to the reduced HRV in this mode; yet a stable structure of standing waves and harmonics is maintained throughout the consecutive spectra.

Psychophysiological Incoherence

Figures 29 and 30 show the waterfall plots of the ECG spectra for an individual’s experience of two distinct levels of anger, which are examples of the Psychophysiological Incoherence mode and the hyper-state associated with the Extreme Negative Emotion mode, respectively. In this case we are using a single individual’s experience of anger to show how the activation of extreme negative emotion (negative hyper-state) is differentiated from ordinary anger (incoherence). Thus, the ECG spectra are shown for two different segments in a single heart rhythm trace that represent the two modes, each of which is described separately in our discussion here. (The full heart rhythm trace is shown in Figure 10.)

Figure 29 shows the ECG spectra for the first part of the heart rhythm data displayed in Figure 10 (approximately 6–11 minutes), representing the Psychophysiological Incoherence mode. It is evident that the ECG spectra do not exhibit a coherent pattern from one trace to the next, nor do they display the harmonic pattern of waves seen in most of the other examples of the different modes. Therefore, when the heart rhythm is incoherent, so are the spectral patterns in the ECG.

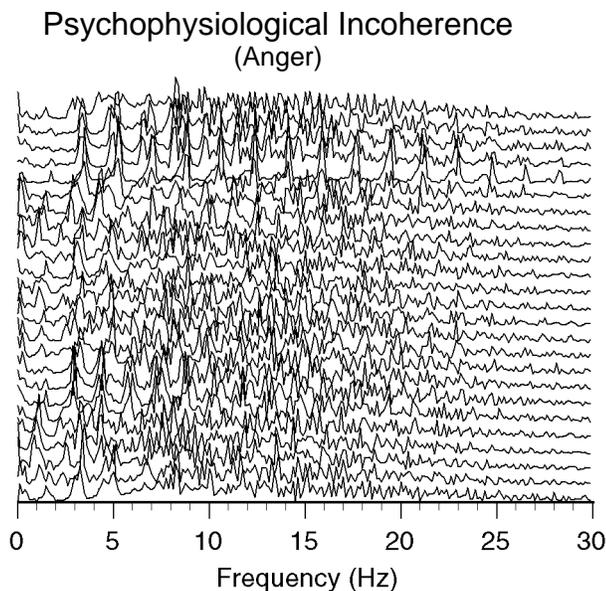


Figure 29. Waterfall plot of ECG spectra for the Psychophysiological Incoherence mode. In this example, anger is used to illustrate the mode, although most negative emotions also lead to incoherence. Note the lack of a coherent structure from spectrum to spectrum and the absence of harmonics in the spectra.

Extreme Negative Emotion

Figure 30 displays the ECG spectra for the heart rhythm data beginning around 15 minutes in the anger trace in Figure 10, where the HRV trace can be seen to flatten out (low HRV). This segment represents the Extreme Negative Emotion mode. As discussed earlier, most negative emotions produce increased incoherence in the heart rhythms—that is, the pattern of heart activity becomes more erratic. However, anger, in particular, is an emotion that can also lead to high sympathetic activation, which in turn can inhibit parasympathetic activity and drive the heart rate to a high level. Together, these responses result in low HRV.

It can be seen that the ECG spectra in this state appear quite different from those in the Incoherence mode, in that they exhibit a series of high-amplitude standing waves that persist from one epoch to the next in the series. This pattern emerges because the interbeat intervals in the ECG have become uniform (low HRV). The spacing between the peaks in the ECG spectrum is a reflection of the time interval between heartbeats. Higher heart rates (short interbeat interval) produce an ECG spectrum in which the peaks in the harmonic series will be further apart. This can be seen by comparing the ECG spectra for the Emotional Quiescence mode (Figure 33) to those for the Extreme Negative Emotion mode (Figure 30). In Emotional Quiescence, the heart rate is much lower than in intense anger. This means that the time interval between each consecutive beat is much greater, and therefore the peaks in the ECG spectra are much closer together than those observed for intense anger. In both the Emotional Quiescence and Extreme Negative Emotion modes, a strong, consistent pattern of standing waves is produced in the electromagnetic field radiated by the heart. This pattern is indicative of a highly coherent order.

Negative Hyper-state: Extreme Negative Emotion
(Intense Anger)

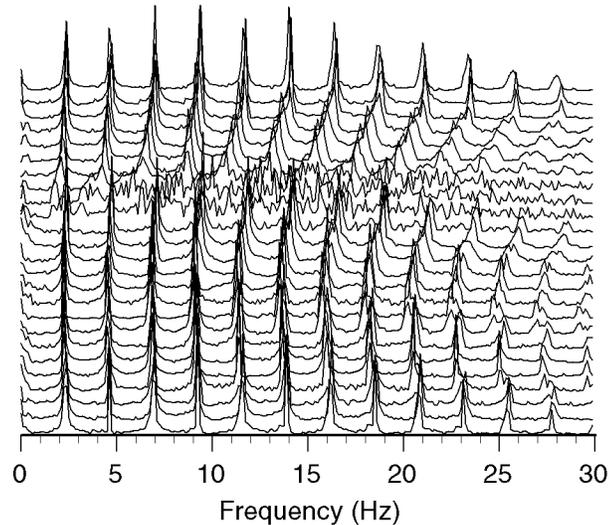


Figure 30. Waterfall plot of ECG spectra for the Extreme Negative Emotion mode. The standing wave pattern is due to the very low HRV in this mode (see text for discussion).

Relaxation

Figure 31 shows the ECG spectra for the Relaxation mode. The spectra for this mode display some similarity to those for the Mental Focus and Coherence modes, in that they have in common the two sets of peaks in the ranges of 3–5 Hz and 7–8 Hz, which are observed in most of the individual spectra. This characteristic is due to the presence of the low frequency rhythm in the HRV. However, in the Relaxation Mode, these peaks are higher in amplitude than those for Mental Focus. This is because the low frequency rhythm is more prominent in Relaxation than it is in Mental Focus, as is evident in the HRV power spectra in Figure 8. Moreover, the spectra manifest a greater density of variability, and hence complexity, while still organized as a coherent structure. The greater complexity is the result of greater high frequency variability in the heart rhythm pattern, which is also apparent in the associated HRV power spectrum (Figure 8).

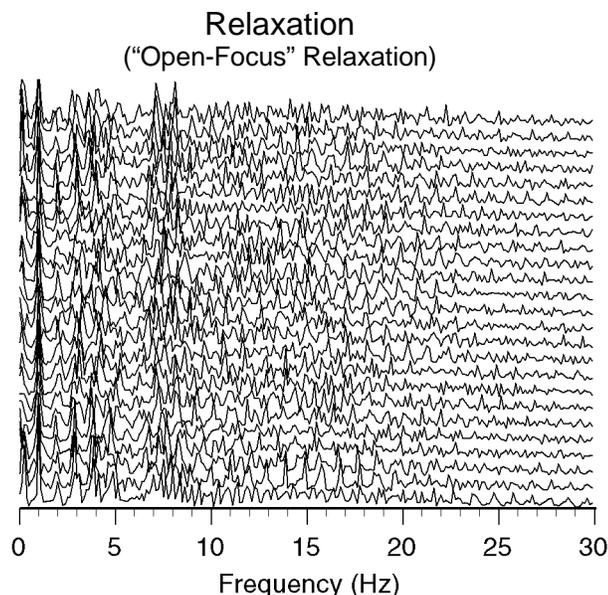


Figure 31. Waterfall plot of ECG spectra for the Relaxation mode. These spectra maintain a coherent structure and rich complexity.

Psychophysiological Coherence

Figure 32 shows the ECG spectra for an individual’s experience of “appreciation,” used to illustrate the Psychophysiological Coherence mode. A strong, consistent pattern of standing waves can be seen in the two sets of peaks occurring in the 3–5 Hz and 7–8 Hz ranges. This is due to the prominence of the low frequency rhythm in the HRV. Even though there is also a high density of variability (complexity) in the pattern of standing waves, a coherent order persists across the individual spectra. A complex yet coherent order of energy movement is optimal for encoding information as a signal. Conversely, when the rhythm of energy has little variability, there is less potential for the encoding of information. Thus, the electromagnetic field generated by the heart in the Coherence mode appears well suited for effective information communication. By comparison, the electromagnetic fields of the other modes display less variability and complexity and therefore do not have the same potential—the “requisite variety”—for information encoding and transmission (Ashby, 1956).

It is apparent that the ECG spectrum alone does not provide an adequate means to clearly differentiate the Coherence, Relaxation, and Mental Focus modes, as their ECG spectra all have a similar appearance. However, as shown earlier, these three modes are clearly differentiated by their heart rhythm pattern (HRV). For this reason, the heart rhythm pattern and HRV power spectrum are generally used as the major identifiers of the psychophysiological modes.

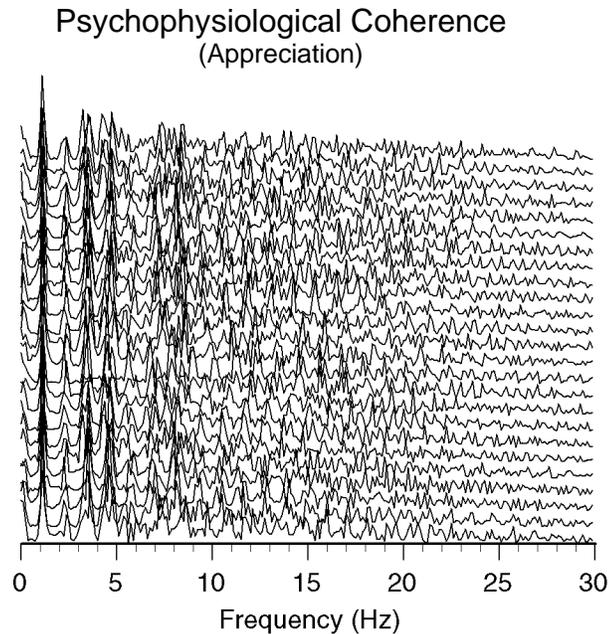


Figure 32. Waterfall plot of ECG spectra for the Psychophysiological Coherence mode. These spectra display a rich complexity and high amplitude, yet retain a coherent structure from spectrum to spectrum.

Emotional Quiescence

Figure 33 shows the ECG spectra for the Emotional Quiescence mode. As discussed earlier, Emotional Quiescence is a peaceful, heart-focused psychophysiological state signified by unusually low HRV. Its ECG spectral profile has a pronounced standing wave-like pattern that, as a harmonic series, is relatively uniform in that it is consistent from epoch to epoch. This persisting “standing wave” pattern in the spectrum of the ECG indicates that the heart is generating a highly coherent electromagnetic field in this mode. Based on subjective reports of this mode, it would appear that the organization of this electromagnetic field reflects a psychophysiological order that is highly conducive to states of peace and serenity and also receptive to experiences of spiritual connectedness.

Positive Hyper-state: Emotional Quiescence
("Point Zero")

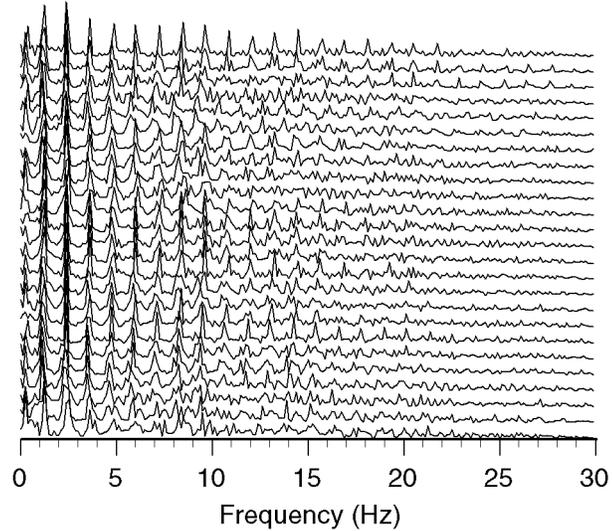


Figure 33. Waterfall plot of ECG spectra for the Emotional Quiescence mode. The coherent structure of standing waves that is constant from spectrum to spectrum is due to the very low HRV in this mode.

The Ethics of Promoting and Assigning Adult Developmental Exercises: A Critical Analysis of the Immunity to Change Process

Sofia Kjellström

Abstract: The *Immunity to Change* (ITC) process devised by Robert Kegan and Lisa Laskow Lahey is promoted as an influential technique for creating individual and organizational change. A critical analysis of the ITC process applied in university settings and organizational contexts show that an unintended result is the unwillingness and inability of some participants to participate adequately. Significant theoretical and ethical implications arise in the interplay between three interrelated variables (a) the role and competence of the facilitator, (b) expectations and capabilities of the participants, and (c) the mental demands and assumptions of the process. The inquiry illustrate that the ITC process is probably built upon an implicit assumption that change into greater mental complexity is always good and right, and its inherent structure creates demands that can put participants “in over their heads.” The main conclusion is that developmentally-aware, ethical approaches to using transformational practices such as the ITC should meet at least three demands: they should be conducted as voluntary activities on the part of well-informed participants, they should integrate an adult developmental perspective into the process itself, and they should openly allow the possibility that it is the organizations that may also need to change.

Keywords: adult development, ethics, organizational change, teaching.

Introduction

How are we to use exercises meant to promote developmental change in an ethically proper way? Adult development advocates are eager to promulgate the practice of transformational change curricula into more complex ways of meaning making; however, rather than uncritically incorporating these techniques into a variety of settings, it is important to consider the hidden assumptions and ethical implications of these techniques. Such examination has the potential of improving the quality and usefulness of techniques within the adult development field (Ross, 2008; Stein & Heikkinen, 2009)

Higher education is one arena easily available for promoting and encouraging adult development of mental complexity. Certainly, if we want education to be informed by adult developmental theory, we must do more than teach theories of adult development as part of course content. Curricula that actually support the development of mental and emotional complexity are necessary (Baxter Magolda, 1992, 1999; Baxter Magolda, 2000, 2001; Hoare, 2006; Kegan et al., 2001; King & Baxter Magolda, 2004; King & Kitchener, 1994; Marchand, 2008; Stevens-Long & Barner, 2006). One way of accomplishing this goal is to incorporate transformational exercises like the *Immunity to Change* (ITC) to class activities. The ITC process devised by Robert Kegan and Lisa Laskow Lahey is promoted as an influential technique for



creating individual and organizational change, but my experiences in utilizing the ITC process are more mixed than the usually enthusiastic responses expressed by for example Jonathan Reams (2009) and Kegan and Laskow Lahey (2009).

The field of fostering adult development includes several methodologies within different domains of life and with different target groups, for example transformative and emancipatory learning, working with moral dilemmas in education, individual and one-on-one efforts, and action inquiry in small groups (Ross, 2006). The ITC process can be seen as an example of a method aimed at promoting development and has been described in several formats: books (Kegan & Laskow Lahey, 2001a, 2009), scientific journals (Bowe, Lahey, Armstrong, & Kegan, 2003; Bowe, Lahey, Kegan, & Armstrong, 2003; Kegan & Laskow Lahey, 2001b), book reviews (Reams, 2009), interviews (Sparks, 2002), and periodicals (Business Digest, 2009). All accounts emphasize the efficacy of this approach, and few negative aspects have been brought to light. I have found no studies that address inadequacies or tests of effectiveness. The texts are written by the originators or people who have used and found the process valuable. I have found no studies that describe the use of the ITC in an educational setting with students.

The purpose of this article is to critically analyze implications of putting the ITC process into practice in educational settings and organizational contexts, the ethics of doing so, and key assumptions that underlie the procedure. This article uses a three-part presentation that includes the basic structure of the ITC process, an example of how it was incorporated in higher education, and the results of that experience. This background sets the stage for a critical examination of the role of the teacher or facilitator, ethical implications of participants' abilities and reactions, and underlying mental demands and assumptions. Desired outcomes of the process are also discussed. Ethical considerations and how assumptions of adult development shape the process are at the heart of the concerns discussed in this article. Specific difficulties of using the ITC in an educational setting are the starting point, but the analysis expands to encompass implications for other situations, for example working life, and universal inquires and objections.

The ITC Process in Practice

The Methodology of the ITC Process

The method was initially created to facilitate individual and organizational change in corporate settings (Kegan & Laskow Lahey, 2001a). The methodology addresses two questions: why changing human behavior is so difficult, and why achieving desired behavioral changes does not happen as often as we would prefer. The method provides a tool to overcome these concerns by identification of a personal immune-system that works to inhibit certain behaviors and/or the fulfillment of certain values. It is based upon the assumption that real change is not a matter of learning new skills. Rather, it requires changes in the level of mental complexity. The goals or possible outcomes of the ICT are "personal and professional well-being" (Bowe, Lahey, Armstrong et al., 2003, p. 716), more effective organizations, and development of mental complexity.

The ITC process can be seen as an application of the constructive-developmental theory by Robert Kegan (1982, 1994). Kegan proposes three adult meaning systems that make sense of the

world in qualitatively different ways: socialized mind, self authoring mind, and self-transforming mind. Persons having a socialized mind are strongly influenced by views and expectations of others, which affects how they think, feel and act. With a self-authoring mind, persons have the ability to have one's own view independent of others' expectations since they are able to coordinate other beliefs with their own convictions; they also have the capability to examine thoughts and feelings. For persons with self-transforming meaning-making, one's sense of self is not tied to particular identities and they can look through their own agenda.

The first version of ITC process was described in the book *How the way we talk can change the way we work: seven languages for transformation* by Robert Kegan and Lisa Laskow Lahey, which was followed by popularized and shorter descriptions (Bowe, Lahey, Armstrong et al., 2003; Kegan & Laskow Lahey, 2001b) until the most recent book *Immunity to Change: How to overcome it and unlock the potential in yourself and your organization* appeared. The basic structure of the technique is the same, but the labels, instructions, framing and number of steps have varied (see Table 1). In this article I will refer to the first book and related articles as ITC 1, the new book as ITC 2, and ITC for general statements about the process.

Table 1. Descriptions of the ITC process

		Part 1			Part 2	
		'The Table'			'The Test'	
		Commitment	Doing/not doing instead	Hidden competing commitment	Big assumptions	Reflection and test
(Kegan & Laskow Lahey, 2001a)	Language of commitment	Language of personal responsibility	Language of competing commitment	Language of big assumption. Identifying assumption	Language of big assumption. 4 steps	
(Kegan & Laskow Lahey, 2001b)		Stage 1		Stage 2	Stage 3, 5 steps	
(Bowe, Lahey, Armstrong et al., 2003)	Step 1	Step 2	Step 3	Step 4	Step 5, unclear includes test	
(Kegan & Laskow Lahey, 2009)		Diagnosing ITC			Overcoming the ITC	
(Kegan & Laskow Lahey, 2009)	Commitment (improvement goal)	Doing/not doing instead	Hidden competing commitment	Big assumptions	Three phases, including 9 exercises	

The ITC process has two parts. The first aims at uncovering the commitments to change and diagnosing the person's immunity to change, and the second is a series of exercises designed to create change in behaviors. The first part consists in four steps which are presented in a table of

four columns (see Table 1), where the table is used to structure the process and provide an overview. The work described in the first column is to identify personal commitment, which is done through answering the question: What sort of experiences would be more supportive of your development at work? The formulation of the initial question varies in the different versions. The answer is then examined to identify underlying values and reformulated into a personal commitment. In the second column, behaviors are enumerated – both actions and omissions – that interfere with the commitment.

The task of the third column is to identify a competing commitment. Participants are prompted to reflect on fears or anxieties that arise if the identified actions, in column two, are not performed. The passive worries are then transformed into an active statement, which becomes the competing commitment. This serves as a new explanation of why certain behaviors are not performed, since persons hold values that are in contradiction to and in competition with the other. What was previously viewed as obstructive behaviors is now seen as supportive actions of the competing commitment, but nevertheless preventing people from achieving their primary goals. A first picture of the “immunity system” is revealed which is called the immunity map or X-ray since it is “a picture of the invisible made visible” (Kegan & Lahey, 2009, p. 32). Modifying the immune system requires that we identify the underlying hidden assumption on which the competing commitment rests (see column four, Table 1). This assumption is called the ‘big assumption’: it is the internal truth that a person creates to sustain his or her immunity to change; identifying it is a difficult process (Kegan & Lahey, 2001b).

The purpose of the second part of the process is to question and test the validity of the big assumption and thereby overcome the person’s immunity to change, a goal that is realized through several experimental self-reflective exercises including a test. In ITC 1 the second part is described as consisting of four or five exercises, observing and recording current behavior, looking for contrary experiences, exploring the history, and designing, running, and evaluating a test. ITC 2 includes a set of nine exercises in three phases, including all those previously mentioned plus additional ones, for example a pre/post survey to get external input from colleagues and family on your improvement goal, and to reflect on how the learning can be consolidated in the future.

The general structure of ITC 1 and ITC 2 are essentially the same, but in the ITC 2 there are substantial elaborations in the description of the methodology for participants and added checklists and surveys to support and extend the process. Other changes are that the initial question is more value neutral, a greater emphasis is placed on finding a “good” improvement goal and first commitment as a starting point, and the importance of involving family members and co-workers in the process is emphasized.

The Use of the ITC 1 Process in Higher Education

The theoretical work of Robert Kegan is central in the area of adult development (Kegan, 1982, 1994; Kjellström, 2005), and the ITC exercise was incorporated in my university teaching with students (Master and Ph.D. level) and healthcare professionals (mainly nurses and assistant nurses). I used Kegan’s theory in my Ph.D. thesis, and my research position at a university has facilitated deeper studies and use of several adult development methods and theories in research.

Additional writings on the topic proved useful to increase my knowledge of how to facilitate the process, (Bowe, Lahey, Armstrong et al., 2003; Bowe, Lahey, Kegan et al., 2003; Kegan & Laskow Lahey, 2001b; Sparks, 2002). This exercise became part of courses on ethics and professional development on seven occasions, with more than 100 participants. The ITC 1 process was employed in accordance with the recommendations of Kegan and Laskow Lahey, with only some modifications in order to suit the delivery formats in the educational setting. Namely the initial question used to form the first commitment was reformulated to suit students who were not simultaneously working professionals. The process was divided into two parts. The first part asked participants to fill in four columns in a table (see Table 1 & 2), allowing their immunity to change to be identified. The second part was composed of five self-reflection tasks, including a test to perform and evaluate.

Two delivery formats were used with different students groups: meeting in class or interaction through a web platform. I always emphasized that they should not disclose more than they felt comfortable sharing. During a lecture or workshop lasting two hours, students were led through the process of filling in the table and were then encouraged to reflect on their responses and create a test. The filled-in table and written report on the self-reflection tasks were sent to me and discussed verbally in small groups led by me. No written text was shared among the participants, and participants were given the choice of whether they wanted to tell others about their commitments and test results.

In the web-based course the students (health professionals) read an article (Kegan & Laskow Lahey, 2001b), listened to a lecture, and read a sixteen-page Swedish document (created by me because my participants were not used to reading English) that explained all the steps. (Kjellström, 2006). After filling in all columns, they sent their tables to me and to an online discussion forum with four to five participants, where all students saw what others in their group had written. This sharing is an example of moving private or personal assessments into a public sphere. I commented and helped them with the table to ensure participants had an adequate starting point for the next part, which consisted of five tasks. They performed and reported the assignments one by one to the small online discussion group. Subsequently, group participants read and commented on each other's work, because observing others' experiences could provide a valuable learning experience. The reports on each of the five tasks were always read and sometimes commented on by me. The tables were sent to me initially and further distributed if the person consented. The incorporation of group discussions was done to give participants an opportunity to share experiences, and ponder similarities and differences. This is not something that Kegan and Laskow Lahey describe in their first work, but they put an emphasis on the importance of sharing experiences because it illustrates that things that often are considered merely personal are also general for others (Kegan & Laskow Lahey, 2001a).

Results from Doing the ICT 1 Process in the Educational Setting

On the one hand my experiences can be described as a "success." The instructions of the ITC 1 process by Kegan and Laskow Lahey helped me create a learning situation that seemed to work quite well for a majority of the participants. Some students reportedly regarded it as a profound experience that they wanted to continue to use and spread to others. On the other hand, I also had experiences with participants feeling less comfortable in the situation, which could be interpreted

as “failures.” This section will mainly be concerned with what went amiss, because it is the examination of these experiences that builds a foundation for further discussion and a critical analysis of the various factors that might have produced these outcomes and the ethical issues they raise. The two prominent results elaborated here are that persons did not complete required parts of the ITC 1 process, and a few did not want to participate, and therefore refused to do it.

Problems with the first part of the process are that some people had difficulty putting content into the columns. The most common problem was an inability to articulate a personal fear or worry that could be turned into a counter commitment, but it was also problematic to identify the big assumption and to present actions that inhibit the primary commitment. Even after several occasions of written feedback by email or personal communications, a few individuals produced a barely acceptable table as a starting point for the test and self-reflection exercises.

Other difficulties arose in the second part involving the self-reflective tasks. The tests run by my students often tested third column commitments rather than fourth column “big assumptions.” Regardless, a test of the counter commitments seemed adequate for the exercise to be performed. An examination of the 67 tables filled in by health care personnel shows that one of the most common topics was fear of calling attention to someone who is doing something wrong, often because being liked by everyone else is so important to them. When they ran a test where they actually expressed these opinions, they realized for the most part that nothing bad follows such actions, and that raising their voices was generally appreciated. This experience was both powerful and empowering for nearly everyone who ran this kind of test. But an important limitation was that to my knowledge there were no or few generalizations made to other domains of life, which might reduce some of the transformational power of the exercise. Another problem was that when asked to reflect on their own behaviors some people only described actions or reactions of others.

Some people were unable to do part of the exercise as I provided it with its limitations regarding support or assistance, and some students refused to do certain parts, for example, reflect on childhood experiences, provide a personal experience, admit vulnerability, or talk in a follow up group discussion. On one occasion several students objected and had negative feelings about the exercise because it was perceived as being too personal, and the students expressed the idea that it felt very weird to run tests “on” their classmates, which resulted in a discontinuation of the ITC 1 as an obligatory assignment.

Critical Reflections on the ITC Process

The criticism below starts with a focus on the potential impact of two variables that need to be considered: the capacities of the leader or process facilitator and those of the participants. Possible desirable outcomes are discussed and a complementary solution of adapting societal structures to the mental demands of people is proposed. Finally the analysis is concerned with the mental demands in and assumptions of the ITC process, which can play an important part in how the process is utilized. The critical examination of the ITC process is not limited to the first version, because the general structure is essentially the same in all present versions.

Facilitator's Choices and Capacities

This section provides examples of how I handled different situations in order to illustrate more general implications of the role of the facilitator and teacher. I acknowledge that some of the failures are probably due to my way of implementing the process, for example the way I framed and explained the process to the participants. The incident when several students questioned the process accentuates the need to firmly establish the exercise in the work group, a task I probably failed on that occasion since they did not sense a trusting environment. Kegan and Lahey emphasize that a leader needs to be an active advocate of the process by setting a good example and promoting a commitment to positive change work; simply authorizing the exercise is not sufficient (Kegan & Laskow Lahey, 2009, p. 81). In education and classes the teacher is the leader and authority, and needs to establish trust and authority. How a teacher with constraints in his/her role and setting can do this differs from how a process facilitator in another setting can do this: trust is not always consistent with the teaching role—the teacher is often not a confidant whereas a process facilitator may be.

When people were not able to fill in the table or resisted parts of the process I handled this by backing off. For example if the columns were not filled in as required for a perfect starting point, and the feedback had yielded an acceptable table, I viewed this as sufficient, without further judgment or comment. When people did not want to do part of the exercise their wishes were always accepted, and no one was ever forced to participate in any stage. This management was inspired by an ethical consideration, for example inspiration from Kegan and Lahey's ground rules that it is up to the people participating to decide how much they want to share (Kegan & Laskow Lahey, 2001a). Later reflection led me to realize that I had not shared sufficiently with my students my motivations for administering this exercise and my hopes for their beneficial experiences. Transparency about reasons for using the exercise as part of introducing it may have helped both students and me by providing space to discuss successes and failures on individual and group level.

My personal assumption at that time was that personal development in qualitative phases is a positive factor that needs to be promoted. Using Kegan's theory (1982, 1994) to interpret my own orientation toward fostering adult development, I see that it was "subject" in my mind (in Kegan's terms), which means that it was a perspective through which I unknowingly looked at the world. To have a goal of fostering adult development as a subject may cause an overemphasis on the intervention's positive aspects and neglect of its possible side effects. Only when I (or others, presumably) distance myself from attachment to the idea of fostering adult development and take it as an "object," as if being an outsider to the adult development perspective, does the critique put forward in this article become possible. That is the shift I made in order to produce this critique.

In the current educational system the time and competence of teachers is also an important issue to discuss. The most recent version (ITC 2) demands that teachers spend more time doing the first part (Kegan & Laskow Lahey, 2009). The first edition suggested a timeframe of 2-4 hours, to identify the immunity system, but the more recent version includes several examples that expanded the timeframe to two days. Given how classes are scheduled within the educational system, the time with a teacher in class is limited. The question is whether teachers

have enough time, but also whether the time they do have is best put to this task or to other tasks, i.e., is this exercise the ‘best’ use of class time? In addition, do teachers have sufficient psychological training to support the students adequately?

For a teacher to assign any task is an exercise of power. Kegan and Laskow Lahey talk about the need to deliberately create an optimal conflict, which is portrayed the following way:

- The *persistent* experience of some frustration, dilemma, life puzzle, quandary, or personal problem that is...
- Perfectly designed to cause us to *feel the limits* of our current way of knowing...
- In some sphere of our living that we *care about*, with...
- *Sufficient supports* so that we are neither overwhelmed by the conflict nor able to escape or diffuse it. (Kegan & Laskow Lahey, 2009, p. 54)

But what right does a teacher to create optimal conflicts in peoples’ lives? Most people have pressures in all domains of life. Is it good to create another conflict even if the intention is to resolve it in the long run? The answer is not evidently affirmative because there are interventions that promote development without being designed to be structurally disequilibrating (Manners, Durkin, & Nesdale, 2004, p. 21).

One assumption of the methodology is that moving things from the private to public sphere will facilitate a successful process. This is a kind of support group process, but again, people self-select into support groups for the purpose of hearing and listening — there is transparency about what goes on there and strict norms of behaviour. A key aspect of my argument is that in educational settings, the self-selection into classes is for purposes other than personal self development. It is impossible to exert the same kind of normative structure around privacy, since discussing assignments, topics, lectures, homework, and the like is a routine part of the learning process for students in these settings.

Kegan and Laskow Lahey claim that too much adult learning occurs in classes separated from the workplace, and that it is more powerful to teach people in their workplaces together with their colleagues rather than enroll them in individual courses (Kegan & Laskow Lahey, 2009). Although providing learning experiences for adults in the workplace can be beneficial for certain types of material, using the workplace (and the workgroup) as the location for this kind of an exercise also raises concerns. Workers may feel particularly constrained in these settings, believing that their performance on the exercise will influence their employment and/or their professional relationships with their coworkers. One could argue that this limitation can be overcome when the facilitator lays the foundation for trust and safety, but a counterargument similar to the one offered for educational institutions must still be considered: does the organizational environment create an implicit coercion for workers to comply?

Participants’ Choices and Capacities

Several of my students were very perplexed when asked to work on emotional aspects of themselves, finding the task very difficult. They were not used to admitting and articulating emotions or publicly expressing negative aspects about themselves. Education is currently

organized to emphasize cognitive knowledge (Stevens-Long & Barner, 2006), and students do not expect to reveal their emotions or be asked to integrate their self concepts into knowledge construction. The recent book stresses that participants need to be more dedicated to working with an issue that is meaningful to them and to leave behind their immunity to change toward it (Kegan & Laskow Lahey, 2009), but how much commitment can we expect or require from students or employees in a hierarchical structure and culture? As an example, the ITC was used to increase the sales of a pharmaceutical company, but as Abigail Jenkins says in an interview “as it required a significant level of commitment to both personal and group change – while still in the pressure-cooker environment – five team members inevitably left along the way” (Business Digest, 2009, pp. 8-9). This ITC work was facilitated by very competent consultants Lisa Laskow and her colleague Bob Goodman. Noteworthy is the fact that, even with professional facilitators, situations occur where five out of ten participants drop out. Kegan and Laskow Lahey openheartedly admit that 30-40% of the participants did not have a powerful experience with the exercise as it was formulated in the 2001 version (Kegan & Laskow Lahey, 2009), but since the basic structure is the same in the new version, ethical issues undoubtedly remain.

Although a few of my students provided reasons for their decisions of non-participation, e.g., that personal experiences were no one else’s business or that they were involved in concurrent cognitive behavioral therapy, other students may have been uncomfortable with the exercise, but did not voice their objections. This possibility concerns me, both because of the hierarchical nature of the student-professor relationship and because voicing concerns about another person’s actions was one of the behaviors with which people had the most difficulty.

The result of my experience of putting the ITC process in practice leads me to question if all people are willing to do the exercise. Even Kegan and Laskow Lahey give a negative answer to this question. To answer whether all participants are willing to participate in self-reflective practices they state:

Almost none of them had any clue when they began the process of developing their X-rays that they were going to create a picture that would be so revealing – or intriguing – to them. If we had told them beforehand what they were going to produce, some might have declined to participate, and most might have been skeptical. (Kegan & Laskow Lahey, 2009, pp. 46-47)

The quote appears in a section where the authors explain that the people they have coached are not unusual, they are all able to reflect when expected to participate in an ITC process. To me this quote illustrates some legitimate bases for objections. The ethical question is whether it is right to assign tasks that people might have refused to perform had they been adequately informed at the beginning. As researchers we are supposed to involve participants in an informed consent process where the participant is given adequate information and we make sure that true consent is given. Should our students not be treated with equal respect and ethics? A possible objection is that we as authorities have the power to assign tasks in the best interest of the students. But then the questions reappear in a new way: do we know that the exercise is in the best interest of the student? One answer is that to increase the future autonomy of a person, we must sometimes exercise authority that overrides the present autonomy in a pre-intervention

information process (Beauchamp & Childress, 2009). For example, in order to increase a person's ability to make better choices in life, information is needed. If the information is provided against the will of people, then their right to decide to access that information is currently overruled. The ethical justification for this paternalistic behavior is that the autonomy will be increased in the long run and produce a greater good. The problem is that this solution does not see or solve the challenge that providing the information changes the situation for every individual that is exposed to the new information. By its nature, information places a demand on people to do something with it.

A more intriguing question is whether all students and adults are able to participate in these kinds of practices. Kegan and Laskow Lahey state that the people involved in their sessions are not unusual people; instead, they report that their participants are "every kind of person you can imagine," but then admit that participants are primarily college educated middle class people from all over the world (Kegan & Laskow Lahey, 2009, p. 45). In other words, they are part of professions that can afford to pay for consultants and do not for the most part include working class people. My interpretation is that their reports are not based on people who are (on average) at an earlier stage of development, since they have not worked with people at plain jobs which require less complexity in reasoning (Commons, 2007). In defense of Kegan and Laskow Lahey, they give two examples where they specify the level of development, one with a socialized mind and one with a self-authoring mind according to Kegan's classification (Kegan, 2003; Kegan & Laskow Lahey, 2009). But they do not comment on those 3-13% percent of people who have developed less complexity than the socialized mind (Kegan & Laskow Lahey, 2009). What are the implications if not all participants are able to do the transformational training? Some people may have reached developmental limits due to factors like genetics and psychological damage earlier in life or cultural limitations (Commons, 2008). Individual development is affected by many influences: evolutionary, ecological, genetic, neural and hormonal, biomedical, nutritional, phenotypic, proximal and distal environmental influences that are all necessary but not sufficient to analyze a person, and it is a hard task to disentangle, predict and thus account for all influences (Wachs, 2000).

What's the Desired Outcome? Changing People or Organizations?

When the ITC process is used it is important to consider the desired outcomes. Is people's work with trying to dissolve their immunity to change a mutually agreed on desirable procedure? Does doing so serve the interest of the individual or the organization or both? In the ITC 2, the authors have expanded the exercise from an individual tool to an organizational device: "... the purpose of our work, however we went about it, was to grow the organization's ability to better deliver on its aspirations" (Kegan & Laskow Lahey, 2009, p. 82). This could make the process more powerful (Kegan & Laskow Lahey, 2009), but it could also increase the potential for two kinds of misuse. First, there is no inherent ethics built into the process, which means that it could be used to improve teamwork and thereby increase productivity for a company that destroys the environment. One solution of this is to make an ethical assessment before making the ITC available to a client company. Secondly, workers may be treated as means to a "greater" goal of increased productivity. There is quite a difference for people between signing up for self-improvement workshops in their spare time, and to be assigned to do something like the ITC because the employer decided that all workers need to improve their performance. One might

even go as far as questioning if this is “adult development” or manipulation? Is participation in the ICT process empowering or does it make participants more malleable with increasing their self doubt? In summary, many ethical questions are worth investigating in general and in process design.

Developmentally-aware leadership means that leaders need to be more patient and understand that change takes time (Kegan & Laskow Lahey, 2009). This knowledge could be applied in all domains in life, and maybe there are better ways to be patient with co-workers, peers, students, and family. A complementary solution to the increasing mental demand of modern life, which seems to be invisible for some, is to adapt the workplace to people instead of changing people to adapt to workplace. Great parts of working life today require what Kegan calls a self-authoring way of meaning making in many cases (Kegan, 1994; Kegan & Laskow Lahey, 2009). This could be interpreted to mean there is a challenge to raise individuals to this level. Another way to consider this challenge is to ask the question: How can educational settings and workplaces change so that they make room for all kinds of people at the socialized order, the self-authoring order and the self-transforming order? The fact that organizations and companies require employees of higher levels of complexity (Kegan, 2004) is a challenging issue, because the costs are probably both individual and societal. And I do not think the solution of encouraging people to change and “develop” is either possible or an ethically-sound solution for all situations, because it will create expectations that are too challenging and over the heads for some.

I propose an analogy to support my points. If we have two ends in our hands, and we cannot make them meet, we can assume one is fixed and pull hard on the other or we can assume both are movable and try to bring them closer by pulling on both, or we can find a third piece that spans the gap between the two. If there is some problem in, for example, how workers “fit” into workplace organizations, and there is assumed to be only one solution, then it is possible to say that the organization refused to show flexibility (or growth or development) along the lines required by the workers. If a worker is not completing the piecework that flows along the assembly line, is it the “fault” of the worker, the “fault” of the assembly line organization of work process, the “fault” of the speed of the assembly line, or the “fault” of the employer who has assigned one worker so many tasks? Or does it indicate that there seem to be multivariate conditions that can account for a given situation, and how one sees it depends on one’s perspective. One motivating perspective is that employers want employees who can do certain things at given levels of complexity. Certainly one might hope that all people can develop to their full potential, but *that* that potential differs among people for numerous reasons needs to be considered (Commons, 2008).

The Mental Demands in and Assumptions of the ITC Process

The ITC is built on the key assumption (that I also share), that people do grow as adults, and even if it is often a slow process it is possible to further this development by adaptive and transformative exercises. The assertion is also that the ITC exercise actually can help people grow into new orders of complexity (Kegan & Laskow Lahey, 2009), but to what extent the ITC promotes transformation in orders of complexity is not yet clear. The primary follow up described by Kegan and Laskow Lahey is that people in organizations perceive themselves and others to be doing “better” on particular issues when they have used the process (Kegan &

Laskow Lahey, 2009). Kegan and Laskow Lahey do not provide results from any longitudinal studies that track changes over time to document the effectiveness of the method, and neither did I study that with my students.

A meta-review of 36 studies and over 12,000 participants showed that for a majority the developmental level stabilizes by early adulthood (Cohn, 1998). Individual development occurs, but little is known about it because most research has been performed on group data. A few studies have addressed the issue of promoting development among adults, and the results are mixed. Interventions to increase the ability to adopt a social perspective have been successful for children and adolescents, but in two studies “adults did not mature in response to role taking experiences or training experiences designed to increase one’s perspective taking and coping with inner conflict” (Cohn, 1998, p. 41). A few studies have succeeded in promoting development, but particularly few to postformal stages of development (Manners et al., 2004; Pfaffenberger, 2005; Ross, 2006; Torbert, 1994; Torbert & Fisher, 1992). According to Torbert, success factors for practices being developmentally effective are the following.

- (a) Voluntary engagement, (b) endurance over years, (c) guidance for participants by individuals who measure at later action-logics, and (d) research/ learning that integrates inquiry and action in the present moment (Torbert, personal communication in Ross, 2006, p. 41)

The ITC process does not live up to all these criteria. This does not preclude the possibility that for certain individuals the exercise will occur at just the right time to be a trigger for a transformational change. If the effectiveness of the process is going to be established, further research into its efficacy would need to be conducted. This, I recommend.

The Mental Demand of the Exercise

To be more specific, and to paraphrase Kegan himself, what are the mental demands of the ITC process (Kegan, 1994)? The ITC exercise consists of two parts, which puts different demands on people. Filling in the table requires a certain level of reflectivity about oneself and one’s actions; in addition, the participant must be able and willing to admit unfavorable aspects of oneself. The exercise is built on the requirement that all participants are able to use, at minimum, formal stage thinking. For example, it is not enough to blame others and make broad generalizations about others or self. To put items in the table requires at least formal stage reasoning because the persons need to see themselves responsible for the commitment (Kegan & Laskow Lahey, 2001a). An adequate understanding of personal responsibility is a formal stage concept which requires formal stage reasoning (Dawson & Gabrielian, 2003; Kjellström & Ross, 2009). In addition, it also requires the ability to present an antithesis of the argument when the counter commitment is identified. In summary, to do the ITC table of four columns requires systematic stage capacity to put formal relationships together coherently (Ross, personal communication, Nov. 30, 2009). In addition, it requires people to be able to reflect upon their emotions and have them as an object, in Kegan’s terms. The second part demands that participants observe their behaviors and interactions with others, which presupposes individuals have abilities to look at themselves from the perspective of another person.

An ITC Process on the ITC Process

What would happen if we performed the process on the process (see Table 2)? Multiple commitments are possible in a situation simultaneously, which means that others might come up with different first commitments, but this is my proposal. Thus, the objective of this thought experiment is to surface a possible underlying assumption of the process: in other words, on what sort of internally-presumed truth the process may rest on. As a starting point, we have to state a premise that there is an imaginary self (let us just call it “the ITC-itself”) that could be seen as the subject (in place of a typical person-participant); it represents the ITC performing its own process on itself. For the first step, the ITC-itself’s first commitment could be that positive adult development should be promoted because it is possible. In the second step, ITC-itself experiences that what interferes with this commitment’s goal are that people do not always change. In addition there is Kegan’s explicit commitment that increased mental complexity is necessary for people to adapt successfully to the environment, else they are “in over their heads.” The ITC-itself may assume that its design or explanations are inadequate to get intended results. In the third step, the ITC-itself identifies that its actions that undermine its first commitment (above) are using its steps with people that cannot or will not perform and use them. In reaction to that assessment, the counter commitment may be to not show or admit weakness in the ITC process because then the ITC-itself could no longer believe in its own effectiveness. A second possibility is that the ITC-itself would not admit the possibility that there will be those who simply do not change by using the ITC. That would challenge the primary assumption that people *can* develop by using the ITC.

Table 2. The ITC process on the ITC process

Commitment	Doing/not doing instead	Hidden competing commitment	Big assumptions
Adult development should be promoted.	To design the ITC in a way or explanation inadequate	To not show or admit weaknesses in the ITC process; To ignore those who do not change	Change to more mental complexity is always right and good.

My suggestion is that the ITC process is based upon the “big assumption” that change of mental complexity is always right and good. But this assumption is not “taken as an object” and discussed by its authors. Authors of the books express an awareness that sometimes people do not change. This “failure” to change is explained by recognizing that change is difficult, that it is a slow process, that it takes personal motivation, integration of thought and emotions, connection between mind and hand, and a supportive social context (Kegan & Lahey, 2009). However, the normative notions that change in complexity is good or the possibility that conditions may exist when it is not a good fit are surprisingly not considered or challenged.

The second part of the ITC process is to modify and test the major assumption. Doing so would, for example, include finding cases when it is not in the best interest of people to change. Persons in this category could be those who are on the first phase of a next level of development and in the process of translating their experiences, or people who are stuck in their current way of living and do not have the abilities and support as described above. An alternative assumption would be that some people also have reached the limits of their individual means of growing

meaning-making systems of higher complexity. This could mean that using the ITC process in a setting with such individuals will put further pressure on those individuals, possibly creating even more barriers to the possibility of a harmonious life. If this is the case and an underlying but now conscious assumption, we have a basis for considering the previous comments regarding ethics and the need to adapt workplaces and social structures to people's different ways of meaning making.

If my proposal of the ITC's "big assumption" is regarded as a compelling interpretation, and the implicit and invisible "big assumption" behind the ITC is spelled out and replaced by a conscious assumption of change being *sometimes* beneficial and possible, then the ethical road forward is to build this into the ITC process. Inspiration might come from the TIP process (Ross, 2006), which is constructed with the conscious underlying assumption that there are both people who benefit from change and those who do not.

Conclusion

The ITC process seems to be constructed on a major implicit assumption of change as always beneficial to all people. This is highly questionable, but regardless of the proof of its validity, several ethical questions remain that are not easily answered: Should students be required to go through this process? Should employees in a given workplace be required to do this? Should they be able to refuse to participate without fear of negative consequences? The proposal is that an ethical way of using the ITC process is to let participants be given a real choice of whether they want to take part in it or not. When the process is introduced in educational settings or at workplaces, it ought to be introduced as an entirely voluntarily practice. And when people have consented to involve themselves, their consent needs to be renewed continuously through the process.

It is possible to see Kegan and Laskow Lahey use of the ITC process as a primarily exogenous change devise, and a more ethical approach would be to use it as an endogenous process, where the change grows and is determined from within the individual. If the ITC process is to be used, it needs to be carefully introduced in a supportive environment with engaged and competent teachers who are willing to share and scrutinize their own assumptions about this exercise. Participants' developmental capacities for the complexity of performing the ITC may make its component parts impossible for some participants to complete. A great challenge is how facilitators can first ensure that their targeted participants are suitable for the process.

The relationships among participants, ITC facilitators, and the demands of the ITC process need to be scrutinized further. The ITC process requires at least systematic reasoning, where one can reflect on, compare/contrast, and discuss thoughts and feelings. Twenty-five percent is the highest commonly-estimated (in the adult development field) percentage of people in Western settings who can perform tasks at the systematic stage. Not all participants want to expend that effort or can. With a supportive facilitator, some people will be helped. Arguably more important, a skillful facilitator will be aware of subtle nuances across individuals in a group and lift demands from people who do not want to be part of an ITC process, or who may need an alternative, less challenging exercise.

The main conclusion is that inherent structures in the ITC process might produce some of the unintended results where people do not want to or cannot participate as a facilitator intends. If filling in the four columns requires systematic capacity to put formal relationships together, then abstract and formal stage participants, likely present in both the university student population and many workplaces, will probably be “in over their heads.” This represents an important area for further research in the field of adult development, education, and organizational development.

The proposal in this article is that what is missing in the ITC process is that adult “development” is not used *as a perspective on* the ITC process to pre-understand possible successes and failures. For example, in educational settings, it is an improvement if education is structured to promote mental complexity. But this means that not only must we be aware of students’ qualitatively different ways of learning, making meaning, and processing knowledge, but we must also take as a starting point people’s different levels of comprehension and construct different circumstances and experiences better tailored to these differences. Until we have sufficient information and the appropriate training to take this next step, we need to critically evaluate the use of transformational exercises and openly acknowledge the practical limitations, ethical matters and theoretical assumptions that they are based upon. An open creative dialogue on these matters is essential and I invite and request imaginative responses. The question for consideration by those using the adult development perspective now and in the future is how to deploy an ethical synthesis that coordinates two needs: using adult developmental methods on the individual level to help adapt people to the current societal systems they find themselves in, and using adult development insights to change societal structures to allow adults to evolve endogenously. Further research is indispensable not only on the effectiveness of educational designs and transformative exercises that claim to increase the level of mental complexity, but even more importantly, on how society and organizations can be structured to honor and respect people where they are.

References

- Baxter Magolda, M. B. (1992). *Knowing and reasoning in college: Gender-related patterns in students' intellectual development*. San Francisco: Jossey-Bass.
- Baxter Magolda, M. B. (1999). *Creating contexts for learning and self-authorship: constructive-developmental pedagogy*. Nashville, TN: Vanderbilt University Press.
- Baxter Magolda, M. B. (2000). *Teaching to promote intellectual and personal maturity: incorporating students' worldviews and identities into the learning process*. San Francisco: Jossey-Bass.
- Baxter Magolda, M. B. (2001). *Making their own way: narratives for transforming higher education to promote self-development* (1st ed.). Sterling: Stylus.
- Beauchamp, T. L., & Childress, J. F. (2009). *Principles of biomedical ethics* (6th ed.). New York: Oxford University Press.
- Bowe, C. M., Lahey, L., Armstrong, E., & Kegan, R. (2003). Questioning the 'big assumptions'. Part I: Addressing personal contradictions that impede professional development. *Medical Education*, 37, 715-722.
- Bowe, C. M., Lahey, L., Kegan, R., & Armstrong, E. (2003). Questioning the 'big assumptions'. Part II: recognizing organizational contradictions that impede institutional change. *Medical Education*, 37, 723-733.

- Cohn, L. D. (1998). Age trends in personality development: A quantitative review. In P. M. Westenberg, A. Blasi & L. D. Cohn (Eds.), *Personality development: theoretical, empirical, and clinical investigations of Loewinger's conceptions of ego development* Mahwah, New Jersey: Lawrence Erlbaum.
- Commons, M. L. (2007). Bringing about change in workplace behavior. *Behavioral Development Bulletin*, 13, 35-42.
- Commons, M. L. (2008). Implications of hierarchical complexity for social stratification, economics and education. *World Future*, 64(5-7), 430-435.
- Dawson, T. L., & Gabrielian, S. (2003). Developing conceptions of authority and contract across the lifespan: Two perspectives. *Developmental Review*, 23(2), 162-218.
- Hoare, C. H. (2006). *Handbook of adult development and learning*. Oxford: Oxford University Press.
- Business Digest. (2009). Immunity to change: How to release the potential of individuals and organizations. *Business Digest*, 197, 1-10. Retrieved from <http://slab500.com/mindsatwork/images/resources/resources-BusinessDigest2009.pdf>
- Kegan, R. (1982). *The evolving self: Problem and process in human development*. Cambridge, UK: Harvard University Press.
- Kegan, R. (1994). *In over our heads: The mental demands of modern life*. Cambridge, MA: Harvard University Press.
- Kegan, R. (2003). Hidden curriculum of adult life: An adult development perspective. In T. Hagström (Ed.), *Adult development in post-industrial society and working life* (2nd ed) (pp. 21-48). Stockholm: Stockholm University, Dept. of Education.
- Kegan, R., Broderick, M., Drago-Severson, E., Helsing, D., Popp, N., & Portnow, K. (2001). *Toward a new pluralism in ABE/ESOL classrooms: Teaching to multiple "cultures of mind."* Cambridge: NCSALL.
- Kegan, R., & Laskow Lahey, L. (2001a). *How the way we talk can change the way we work : seven languages for transformation*. San Francisco: Jossey-Bass.
- Kegan, R., & Laskow Lahey, L. (2001b). The real reason people won't change. *Harvard Business Review*, 79, 85-92.
- Kegan, R., & Laskow Lahey, L. (2009). *Immunity to change: How to overcome it and unlock the potential in yourself and your organization*. Boston: Harvard Business Press.
- King, P. M., & Baxter Magolda, M. B. (2004). *Learning partnerships: theory and models of practice to educate for self-authorship*. Sterling, VA: Stylus Pub.
- King, P. M., & Kitchener, K. S. (1994). *Developing reflective judgment : understanding and promoting intellectual growth and critical thinking in adolescents and adults*. San Francisco: Jossey-Bass Publishers.
- Kjellström, S. (2005). *Ansvar, hälsa och människa: En studie av idéer om individens ansvar för sin hälsa (Responsibility, health and the individual: A study of ideas on personal responsibility for health)*. Linköping: Institutionen för hälsa och samhälle, Linköpings universitet.
- Kjellström, S. (2006). *Bli medveten om värderingar: en övning (Become aware of values: an exercise)*. Unpublished manuscript.
- Kjellström, S., & Ross, S. N. (2009). *Older persons reasoning about responsibility for health: variations and predictions*. Manuscript submitted for publication.
- Manners, J., Durkin, K., & Nesdale, A. (2004). Promoting advanced ego development among adults. *Journal of adult development*, 11(1), 19-27.

- Marchand, H. (2008). Intellectual and ethical development in higher education students: pedagogical implications. *Sísifo: Educational Science Journal*, 7, 9-16.
- Pfaffenberger, A. H. (2005). Optimal adult development: An inquiry into the dynamics of growth. *Journal of Humanistic Psychology*, 45(3), 279-301.
- Reams, J. (2009). Immunity to change: A report from the field. *Integral Review*, 5(1), 170-182.
- Ross, S. N. (2006). Effect of a structured public issues discourse method on the complexity of citizens' reasoning and local political development. *Dissertation Abstracts International*, B 68(02), UMI No. 3251492.
- Ross, S. N. (2008). Using developmental theory: When not to play telephone games. *Integral Review*, 4(1), 31-46.
- Sparks, D. (2002). Inner conflicts, inner strength: An interview with Robert Kegan and Lisa Lahey. *National Staff Development Council*, 23(3), 66-68.
- Stein, Z., & Heikkinen, K. (2009). Models, metrics, and measurements in developmental psychology *Integral Review*, 5(1), 4-24.
- Stevens-Long, J., & Barner, R. (2006). Advanced avenues in adult development and learning: the role of doctoral study. In C. Hoare (Ed.), *Handbook of adult development and learning* (pp. 445-475). Oxford: Oxford University Press.
- Torbert, W. (1994). Cultivating postformal adult development: higher stages and contrasting interventions In S. R. Cook-Greuter & M. E. Miller (Eds.), *Transcendence and mature thought in adulthood: Further reaches of adult development*. Lanham: Rowman & Littlefield Publishers.
- Torbert, W., & Fisher, D. (1992). Autobiographical awareness as a catalys for managerial and organizational development. *Management Education and Development*, 23, 184-198.
- Wachs, T. D. (2000). Necessary but not sufficient: the respective roles of single and multiple influences on individual development. Washington: American Psychological Association.

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Reliability and Validity Tests of the Harthill Leadership Development Profile in the Context of *Developmental Action Inquiry* Theory, Practice and Method

William R. Torbert, Reut Livne-Tarandach

Abstract: In this paper, we describe how the Harthill Leadership Development Profile (LDP), a language-based instrument has evolved from Jane Loevinger's Washington University Sentence Completion Test (WUSCT), and has been redesigned to assess and offer feedback about adults' action logics in work or educational settings, in the context of Developmental Action Inquiry (DAI) theory, practice, and method (Torbert, 1972, 1976, 1987, 1991; Torbert & Associates, 2004).

Next, we challenge a recent critique of the LDP as a soft measure unsupported by published, quantitative psychometric reliability and validity studies (Stein & Heikkinen, 2009) and present both previously unpublished and previously published-but-not-aggregated studies illustrating Harthill LDP as a well-calibrated measure of adult ego-development.

Because the DAI approach to social inquiry and social practice invites us all to interweave first-, second-, and third-person inquiry and everyday action, the validity studies reported tend to concern field-based experiments seeking to generate developmentally transforming change in adults, including the researchers and/or interventionists, as well as in the organizations in which they participate.

In our conclusion, we briefly consider what a social science and a social practice based on the developmentally late action-logics will look like, once social science is recognized as embracing, not just 3rd-person empirical positivist research "on" subjects, but also 1st-, 2nd-, and 3rd-person research and action *with* co-participants in live settings.

Keywords: Action-logic, developmental action inquiry (DAI), Harthill leadership development profile (LDP), reliability, validity.

Developmental Action Inquiry: Theory, Practice and Method

Developmental Action Inquiry (DAI) is an approach to social science and to personal and social life that posits a sequential series of increasingly complex, inclusive, and mutually-transforming action-logics through which individual persons, conversations, relationships, organizations, and scientific paradigms may evolve as they intertwinedly act and inquire.

Drawing on the first-person action research of the Gurdjieff Work tradition (Ouspensky, 1949), as well as on the second-person "action science" of Chris Argyris (Argyris, Putnam & Smith, 1985), and on the third-person developmental theorizing of Erikson (1959), Torbert (1972, 1976, 1987, 1991, 2000a, 2000b; Torbert & Associates, 2004) has demonstrated how to interweave first-, second-, and third-person research methods with first-, second-, and third-



person practices to study the past, the present, and the future in ways that generate single-, double-, and triple-loop feedback (Chandler & Torbert, 2003; Starr & Torbert, 2005) that leads to increasingly timely action and inquiry (Torbert & Martinez, forthcoming). We will not summarize the DAI approach any further here, but the reader will find it illustrated in the validity studies described below, and the approach is reviewed in Herdman-Barker, Livne-Tarandach, McCallum, Nicolaides, & Torbert (2010).

In 1978, Torbert chose to begin working with, and adapting, Loevinger's Washington University Sentence Completion Test (WUSCT) as the third-person empirical measure of development that most closely tracked DAI theory at that time. We now turn to the question of how the WUSCT was gradually adapted to become the Harthill Leadership Development Profile (LDP).

The Development and Evolution of the Harthill LDP

The Harthill LDP (LDP) is a language-based instrument designed to assess adult developmental action-logics as part of the third-person empirical testing of DAI propositions. The current version of LDP includes thirty-six open-ended sentence stems that, upon completion by participants into sentences, enable one to measure adult action-logics. The HLDP evolved out of Loevinger's WUSCT (Loevinger, Wessler, and Redmore, 1970), and now includes 24 of Loevinger's original items along with 12 new items designed to improve Loevinger's original test in a number of ways.

First, in order to move away from the original focus of the WUSCT on women's issues and thereby expand the LDP's generalizability, the current version of the HLDP omits a number of gender-based items such as "The worst thing about being a woman...", "A good mother...", and "For a woman a career is...". Second, to improve the tool's face validity and usefulness as a work-related, leadership development instrument, the current version includes work-related stems, such as "A good boss..."; "A person who steps out of line at work..."; "I am powerful..."; "When it comes to organizing my time..."; and "Teams..."). As will be detailed below, the responses to the new stems correlate better with an individual's overall profile rating than responses to the former stems did, thus improving the overall reliability of the measure. Together, the additional stems incorporated in the LDP introduce a meaningful and unique contribution because they expand the scope of generalizability of the LDP to better map management oriented themes that are at the heart of developmental implementations in organizational contexts.

In addition to gradually substituting new stems for previous ones, many other changes, described in greater detail in Herdman-Barker & Torbert (2010), have been made in the transition from the WUSCT to the LDP. The names of the developmental action-logics have been changed, along with key characteristics, to make them less evaluative, more descriptive, and more useful as feedback to respondents. DAI theory posited an action-logic between Loevinger's 3 and 4, and we found that the highest proportion of most of our samples scored at this in-between point, which we named Expert and defined. DAI theory also defined the latest (and rarest) action-logics quite differently from Loevinger, naming them Alchemist and Ironist. Cook-Greuter (1999) first re-defined and successfully tested new scoring procedures for

these action-logics, and Herdman-Barker and Torbert (2010) later further redefined the scoring procedure and performed the construct validity test described toward the end of this paper.

Today, the names of the DAI personal action-logics, in developmental order, are: Opportunist, Diplomat, Expert, Achiever, Individualist, Strategist, Alchemist and Ironist.

History of Reliability Testing of the WUSCT and the Harthill LDP

The 2004 Torbert & Associates book *Action Inquiry: The Secret of Timely and Transforming Leadership* (Berrett-Koehler, San Francisco) contains an 18-page appendix on the history of the Harthill LDP up to that point. That appendix contains references to a large number of quantitative studies particularly testing the reliability of Loevinger's WUSCT, from which the Harthill LDP has evolved.

We will not repeat that material here, except to let the reader know three related points. First, our own earliest attempts to do developmental research in the 1980s used the WUSCT, relying on the extensive reliability and validity findings about the WUSCT at that time, and working with WUSCT scorer Susanne Cook-Greuter to test whether respondents' WUSCT ratings corresponded to the predictions of Developmental Action Inquiry theory for how managers and other professionals measured at different action-logics performed. As will be reported in the validity testing section, we repeatedly found highly significant correlations accounting for unusually high percentages of the variance in criterion variables.

Second, Susanne Cook-Greuter was a Loevinger-authorized high-reliability scorer of the WUSCT in 1980, and she was the primary scorer of all the research reported in this article until 2005. During the 1990s Cook-Greuter redefined the later action-logics and their scoring procedures, showing high reliability results. Based on 60 protocols, she and another rater trained in the new scoring procedures achieved a Pearson correlation of .95, beyond the .0001 level of significance (Cook-Greuter, 1999, p. 115).

Third, in the early 2000s, Cook-Greuter trained Elaine Herdman-Barker as a high-reliability rater of the evolving measure. Herdman-Barker is now Harthill's lead rater and executive coach using the LDP in a constructivist developmental approach to coaching with other colleagues in Harthill.

Since 2005, Harthill has conducted a further series of six reliability tests to date among the Harthill LDP's current raters. First, we tested the extent to which the set of 36 stem-responses used in LDP can be aggregated to one score reflecting the center-of-gravity profile action-logic. To do so we tested the internal consistency by calculating the Cronbach's alpha score for the 36 response ratings. Cronbach's alpha values range from zero to one, one indicates perfect internal consistency and zero indicates no internal consistency. In general, Cronbach's alpha values higher than .8 are considered satisfactory as indicators of internal consistency (Schutt, 2004). Our analysis of the internal consistency of LDP was built on 891 distinct profiles, scored between 2005-2008 and generated Cronbach's alpha of .906, a relatively high value indicating good internal consistency that justifies the aggregation of stems into one score reflecting a single action logic.

Moreover, as the LDP includes six new stems, we assessed the extent to which these stems contribute rather than dilute the LDP assessment. To do so we explored the correlation between the six new added stems and the final profile scores and found that these correlations were relatively high (.86-.89), and that these were equal to or higher than the correlation found in previously used stems. This suggests that the newly introduced stems have added to the reliability of the measure and therefore seem to be adding to, not subtracting from the reliability of total profile scores.

Furthermore, to assure that no order effect influenced the consistency of the scale we conducted two separate analyses. First, we calculated the average individual-response ratings for each stem to the total-protocol-rating correlations for every one of the 36 stems in our 891 sample of profiles. These correlations ranged from .82 - .89 with an average of .86 across all stems. As none of the stems showed dramatically low correlation and as no particular pattern of correlation size order was evident in this set, we suspected that an order effect is unlikely. Yet, to rule out the possibility that the gaps between stems scores and profile ratings may have been influenced by stems order within the LDP sentence completion form, we used a linear regression building on 891 profiles and found that stem order had a significant effect but that the size of its effect explained less than 5 % of the variance in the gaps between stems and profiles scores. This suggests that while order effect may have a statistically significant impact, the sheer size of its impact is negligible due to its low practical significance (Peterson, 2008).

Another dimension of reliability testing concerns the assessment of inter-rater reliability. As the majority of stems included in the current version of the LDP are built on prior validated work by Loevinger and Cook-Greuter, and since Herdman-Barker and Cook-Greuter had attained a documented inter-rater reliability of .69 perfect matches and .90 within one level (when there were seven different levels), we have explored the extent to which the six newest business-related stems introduced to this version yield consistent scores. An authoritative test of reliability is appropriate only after scoring manuals for all the new stems are completed, and the scorers have trained with them. Nonetheless, in 2005 we completed a preliminary reliability test between Cook-Greuter and Herdman-Barker that included blind rating of the six new stems of 20 LDP profiles and found .74 agreement within one level (again, with 7 different levels), illustrating an encouraging reliability for an initial test, though it will be important to show a correlation above .80 in the post-manual test with different scorers.

More recently, another inter-rater reliability test has been conducted, assessing inter-rater agreement between final profile scores across 805 distinct profiles that could have been scored across 13 levels of scoring (from Expert through Alchemist, with three possible levels at each action-logic [e.g., Early Achiever, Achiever, Late Achiever]). The test shows .961 Pearson correlation between the two raters, with perfect matches for 72% of the profiles and agreement within one part-stage in another 22%. Hence, there is either perfect agreement or agreement within one part stage in 94% of the cases. There was a difference of more than one full action-logic between the two raters in only one case of the 805 profiles scored. Moreover, it is important to note that any difference in the two scores was adjudicated prior to sending respondents their feedback packages. It is also important to note that what is different about this last inter-rater reliability test is that, as the reader may imagine, both raters did not separately rate all 805 sentence completion forms. Rather, one rater scored them all, and the second (more

experienced) rater then reviewed the scoring, making changes on individual sentence stem scores and on total protocol rating scores whenever changes appeared warranted.

At first, this procedure may strike the empirically-positivistic, 3rd-person-social-science reader as fundamentally inadequate. Isn't it obvious that the second rater may be subconsciously influenced by the pre-existing score to agree with it? Especially, given the aim of any inter-rater reliability test to achieve the highest agreement possible? And certainly, these questions lead directly to the importance of conducting a traditional inter-rater reliability test when the scoring manuals for the new sentence stems become available. However, consider the following arguments in favor of taking this test seriously as one among several reliability tests.

In orthodox inter-rater reliability tests, both raters know they are involved in a test and are therefore likely to try especially hard to score carefully, making it likely that the test overstates the reliability one would find if both unknowingly scored the same protocols and these scores were later tested for reliability. In contrast, the raters in this case did not imagine they were engaged in a reliability test at all (the test was only conceived post hoc). Thus, the second rater is consciously motivated to make "corrections" whenever warranted (not "as rarely as possible"). And this for three reasons: (a) for the client's sake (to give him or her the most accurate reading possible, in order to best support their further development); (b) for the sake of the continuing training of the second rater; and (c) for the sake of a productive and possibly mutually-transforming dialogue between the raters. Moreover, the accuracy rate in the final reported scores is even higher than .96 because of the change in the score once a discrepancy has been noted. (Of course, the change itself will have been a "mistake" in some small proportion of the cases, but presumably in less than half, since it is the more experienced rater who is making the changes.)

Put differently, the statistics in this inter-rater reliability test are not statistics from a small sample of all the protocols used in one research project or another, but rather represent reliability testing done on a high percentage of the entire population measured. To be more precise, this testing has been performed on all the 2006-2008 Harthill post-conventional protocols (Individualist and later, which are the most difficult to score reliably), as well as on a sample of the earlier action-logic protocols, which represents continuing oversight and feedback to the less experienced rater, even though he has already attained greater than .85 reliability with the lead rater on these.

History of Validity Testing of the WUSCT and the Harthill LDP

As in the case of our review of reliability testing, we will pass briefly over the early history of validity testing of the WUSCT because this history has been so carefully parsed previously (Torbert & Associates, 2004, *Appendix: Concluding Scientific Postscript*; the entire 4th issue of the 1993 *Psychological Inquiry*; Westenberg et al. (Eds.), 1998). As with most psychological instruments, most of the early validity testing of the WUSCT addressed convergent and divergent validity assessing the relation between WUSCT and other psychological measures. For example, a number of personality characteristics have been found to be appropriately associated with predicted developmental action-logics. These include conscientiousness, trust, tolerance, interpersonal sensitivity, psychological mindedness, creativity, and rule-boundedness (in this last

case, a curvilinear relationship, lower in pre- and post-conventional action-logics, higher at conventional action-logics)(Kohlberg 1963, 1964; Lorr & Manning, 1978; Vaillant & McCullough, 1987).

Since the divergent and convergent validity of the WUSCT as the foundation platform for the Harthill LDP had at that time been unusually well established, and because all of our work grew out of the context of Developmental Action Inquiry theory, practice, and method, wherein first-, second-, and third-person research and practice interweave with one another (Chandler & Torbert, 2003; Torbert, 2000a, 2000b; Torbert & Associates, 2004), we believed that our greatest contribution to the credibility of the instrument could be made by demonstrating the construct validity of the later action-logics, as well as the criterion-related validity of the instrument as a whole in field experiments where the intent was to support developmental transformation of individuals and organizations. A recent review of the developmental leadership literature (McCauley et al, 2006) highlights the unique contribution this body of work offers. In other words, our interest in using the LDP has been in pragmatic and theoretical questions of change in the real world, such as: Do managers at different developmental action-logics act differently? What kind of educational organizational structures and strategies support, not just incremental, but also transformational change in students or employees or leaders or oneself? Do leaders at later action-logics support organizational transformation more reliably than leaders at earlier action-logics?

Our use of the instrument began in 1980 when one of us was serving as graduate dean of a management school that was pioneering an “action-oriented” MBA program and that received a research grant to study the efficacy of the new program. Thus, for three years running, all members of the entering and exiting fulltime, two-year MBA cohorts (about 96 per year) were offered the opportunity to participate in research that included the WUSCT in its initial period of transformation toward becoming the Harthill LDP. (At this point, the WUSCT was modified by four managerial stems (e.g., “A good boss...”) that had been independently validated (Molloy, 1978), and language that was more managerial and less evaluative (thus, with greater face validity) had been developed for offering feedback. Participation was voluntary, and participants were offered feedback on their scores, as well as the opportunity to participate in a related laboratory experiment, to be described shortly. Nine of 288 chose not to participate. This research eventuated in four distinct studies with implications for criterion validity in general and the predictive validity of the LDP more specifically.

Study 1

The first confirmation we received of the criterion validity of the WUSCT / LDP) occurred via the unobtrusive measure (Webb et al, 1966) of whether students in fact asked for, and followed through by appearing at the appointed time to receive, feedback on the results of their performance on the measure (Merron & Torbert, 1984; Torbert, 1994). None of those measured Diplomat (4) sought feedback, and only a small minority of those measured Expert (5) did so. A bare majority of those measured Achiever (6) sought feedback, whereas a large majority of those measured as Individualist (7) or later did so. In short, a larger proportion at each later developmental action-logic asked for feedback, a perfect 1.0 correlation on a Spearman Rank Order test, confirming the theoretical claim that later action-logics are increasingly open to (and

increasingly seek out) single-, double-, and triple-loop feedback and learning. Understood this way, this finding supports both construct and criterion validity. It is worth noting that other factors such as age, gender, years of work experience did not explain the difference in behaviors we have documented.

There were some significant qualitative indicators of the validity of the measure as well during this unobtrusive test. One was that those who measured as in between the last conventional action-logic and the first post-conventional action-logic at that time (known only by the number 4/5, between what Loevinger called 4/Conscientious and 5/ Autonomous, and what Kegan ([1982]) called 4/Institutional and 5/Interindividual) were the only ones who participated in a feedback session who took the initiative to set a second feedback session. finding the new theory through which they were learning in a new way about who they were critically helpful in resolving the relativistic confusions in which they found themselves (this is the action-logic now denoted as “7/ Individualistic/ Pluralistic/ Relativistic/ Green”).

A second, equally interesting, qualitative discovery was the action-logic of the only three persons who chose to come to a feedback session who became angry at what the measure indicated about them. For example, one of the three began to tear up all the research sheets on the Dean’s meeting table until the Dean prevailed upon her sense of principle by shouting that she was not tearing up just her own research results, but those of others who deserved equal opportunity to tear up their own – a speech act that caused her to desist. All three of these ‘angry’ persons were among the four who came to a feedback session who were scored at the Expert action-logic, between the dependent Diplomat action-logic and the independent Achiever action-logic. One of the Expert action-logic’s defining characteristics is counter-dependence.

Study 2

The laboratory experiment we invited MBA students and alumni to participate in during the mid-1980s involved taking a three-hour ‘Consolidated Fund In-Basket Test’ designed by the Educational Testing Service (Merron, Fisher & Torbert, 1987). This test positions the respondents as directors of a community fund, appointed in mid-campaign because the prior director has been disabled in an automobile accident. The new director must deal with 34 in-basket items from staff, volunteers, and board members on a Sunday afternoon. Forty-nine MBA students and alumni volunteered to participate in this study, which, like the previous one, promised substantial feedback (not just written, but also in person) about their own and others’ results. The sample consisted of 29 men and 20 women, whose average age was 31, all but two Caucasian, and all of whom had held, or were currently holding, managerial positions in a variety of organizations.

None of the demographic variables (gender, age, or years of fulltime work experience) explained differences in performance. Indeed, at first, *when quality of performance was measured by executives hired by ETS to rate relative efficacy*, it seemed that developmental action-logic as measured by the WUSCT/LDP didn’t explain differences in performance either. However, when independent, trained raters measured the number of *second-order responses* (i.e., occasions when the director asked for or offered double-loop feedback in his or her notes), as well as the number of *collaborative actions* (i.e., when the director invited the other to influence

the outcome), they found statistically significant differences between the respondents measured at conventional action-logics (5/Expert and 6/Achiever) and those measured at post-conventional action-logics (7/Individualist and 8/Strategist).

In greater detail, inter-rater reliability was 92% for the *second-order* variable and 85% for the *collaborative-action* variable. A chi square test showed that the relationship between post-conventional action-logic and *second-order responses* was statistically significant beyond the .01 level; and the relationship between post-conventional action-logic and *collaborative-action* was marginally significant at the .09 level. Two further confirming aspects of the findings are: (a) that, while the largest increase in *second-order* responses occurred between the Achiever and Individualist action-logics, the largest increase in *collaborative-action* responses occurred between the Individualist and Strategist action-logics; and (b) that there were only half as many respondents measured at Strategist as at any of the other three action-logics. Therefore, the marginal rather than robust significance of the second finding may be due to the under-representation of Strategists in the sample.

This study contributes to both construct and criterion validity in that developmental theory would predict such differences in action-complexity between conventional and post-conventional action-logic leaders.

Study 3

In the much larger ongoing field experiment in the Boston College MBA program, two whole classes (n=193) were profiled at the outset and conclusion of their program (Torbert & Fisher, 1992). In spite of the variety of challenges and supports for transformational learning embedded in the organization's regular functioning during the first year of the program (which included rotating team leadership roles, 360 assessments, developmental coaching, action consulting projects with local businesses, etc.), only 3 of the 177 who enacted the many developmental instructional technologies during their first 11 months transformed a full developmental action-logic after the full 22 months, according to the LDP. *By contrast, 15 out of 16* of those organizational participants who did all the above *and also volunteered for and won* a non-remunerative consulting role with new teams, during their 2nd 11-month participation (including depth-clinical training and processing on a weekly basis), *did transform a full developmental action-logic* (see details of this process in Torbert, 1991, ch. 4). (It is noteworthy that, since the participants who became team consultants on average rated at later action-logics than the rest of the participants at the outset of the process, the statistical effect of regression toward the mean was operating *against* the direction of the actual findings on the after test.

This finding accounts for an unusually high proportion of the variance (81%, Goodman & Kruskal's tau) of the participants in the field experiment who are measured as having experienced a transformation of action-logic. The overall results validate the transformational efficacy of a late-action-logic type of intrinsically educational organizing (called 'liberating disciplines' in DAI theory [Torbert, 1991]) that highlights the complementary roles, in generating adult development, of: (a) practical demands of real business clients; (b) depth mutual inquiry practices; and (c) voluntary commitment to one's own development.

Study 4

A field study of 16 MBA project teams (Torbert, 1987) showed that those teams (5 of the 16) with one or more members measured at the Strategist/8 action-logic outperformed teams with no one measured Strategist in three ways: in terms of grades on the two course projects, in terms of members' perceptions of efficient time-use, and in terms of members' perception of within-group support for own learning. (No one knew the students' LDP scores at the time when the outcome data were collected.)

DAI and the LDP as Predictors of CEO Performance in Supporting Organizational Transformations

In the 1990s, Torbert and his associates explored whether Developmental Action Inquiry theory and practice and the validity of the Harthill LDP extended beyond the educational world to the world of business organizations in dynamic markets. They consulted and conducted action research in numerous for-profit and competitive not-for-profit organizations that wished to transform their strategies, leadership cultures, and ways of doing business (Fisher & Torbert, 1995; Rooke & Torbert, 1998; 2005; Hartwell & Torbert, 1999a, 1999b; Torbert & Associates, 2004).

In ten of these organizations, the CEOs all participated in taking (and receiving feedback on) the LDP. In five of the ten cases, the CEOs scored as Strategists. In the other five cases, two CEOs scored as Achievers, two as Experts, and one as a Diplomat. There were four different lead consultants in the ten cases, three of whom scored as Strategists and one of whom scored as Alchemist. The four consultants worked in different combinations with the ten organizations for unusually long periods – an average of 4.2 years. Business and reputational measures showed that seven of the ten organizations improved dramatically during the intervention/studies, while the other three declined either mildly or dramatically. Based on the thick descriptions of the individual cases, three raters achieved perfect (1.0) reliability in determining whether an organization qualitatively transformed into a later action-logic, or did not change at all, or regressed (in one case, one rater differed over how many transformations had occurred in one company).

All five of the Strategist CEOs succeeded, with the help of the consultants, in leading their organizations through one or more organizational transformation. Only two of the other five organizations succeeded in transforming, and the lead consultant in those two cases was the one scored as Alchemist. Two showed no significant change, and the organization led by the Diplomat CEO regressed.

If one adds the HLDP scores of each CEO/Lead Consultant duo, then the combined influence of their action-logics accounts for 59% of the variance (at a .01 level, on the Spearman Rank Order test) in whether the organization succeeds in transforming. (Cohen (1983) classified a large effect size as one that accounts for 25% of the variance in a correlation test (that is, $r=.50$). A test that accounts for 59% of the variance, as this one did, represents an unusually robust empirical finding.) Thus, this study seems to support the predictive validity of the LDP and the theoretical proposition that only persons who transform to the Strategist action-logic or beyond

reach the capacity to reliably support organizational transformation (Torbert & Associates, 2004).

Critical readers will, however, have many questions about possible threats to the validity of this finding, so let us examine the study more closely and consider these questions.

Testing the Third-Person, Internal and External Validity of the Ten-Organization Study

Validity criteria that test the third-person generalizability of empirical findings "after-the-fact" are enumerated and described relatively exhaustively by Cook and Campbell (1979). Their conceptualization of validity has two general components, *internal validity* and *external validity*, defined as follows:

Internal validity refers to the approximate validity with which we infer that a relationship between two variables is causal or that the absence of a relationship implies the absence of cause.

External validity refers to the approximate validity with which we can infer that the presumed causal relationship can be generalized to and across alternate measures of the cause and effect and across different types of persons, settings, and times. (Cook & Campbell, 1979, p. 37)

Cook and Campbell (1979) list 19 different potential threats to internal validity and 13 different threats to external validity. They suggest that researchers focus on the threats most likely to have a significant effect on the validity of their work. In Cook and Campbell's terms, this study is best described as a *nonequivalent control group quasi-experimental design*, whose "treatment" is the presence and action of a CEO and lead consultant at the Strategist action-logic or later and whose "effect" is organizational transformation.

The most significant threats to internal validity in such a study are the *interaction of selection and maturation*, *instrumentation*, *local history*, and *threats to statistical conclusion validity*. And the most significant threat to external validity comes in the form of *insufficient construct validity*, which is a subset of external validity (Cook & Campbell, 1979). Another important threat to the external validity of this study would appear to come from its *small sample size*.

The internal validity threat of *selection-maturation* would arise in this study if Strategist action-logic CEOs happened to be associated with types of organizations that had growth patterns systematically not encountered by the types of organizations headed by CEOs at earlier action-logics. In such a case, it could well be that extraneous causes, not CEOs' and consultants' action-logics, would account for the organizations' transformation. In our study, however, there was considerable variety across the organizations that did and did not transform: a) in size (10-1,019 employees, average=485); b) in type (5 for-profit / 5 not-for-profit); and c) in line of business (investing, automobiles, energy, consulting, education, health care). In short, the successes and failures in organizational transformation are not associated with any of these

variables (e.g., two of the three organizations that failed to transform were not-for-profits, but three of the five not-for-profits succeeded in transforming).

The threat of *instrumentation* arises when there are scaling problems with the measurement of the dependent variable (organizational transformation, in this case) such that changes are more likely to be measured in one group than the other. Looking into our organizations, we find differences in the baseline action-logics of organizational development of the different organizations, and we also find that the three organizations unsuccessful in transforming were among the four organizations in the study that began at a relatively late organizational action-logic. At first, this seems to suggest that the coding scheme the raters employed may not be sensitive to transformations beyond that action-logic, or that such late-action-logic transformation is much less likely to occur than transformations through the earlier action-logics. However, a closer look reveals that six of the seven organizations that were coded as having transformed actually progressed to the organizational action-logic beyond the one at which those three organizations began, thus showing that the dependent variable was in fact sensitive to such transformations and that they do occur with some frequency. In short, when organization transformation failed to occur as indicated by measurement methods, it is unlikely that a limitation in the measuring instrument was the cause.

Another credible threat to internal validity, *local history*, is troublesome if there are events exogenous to the study that affected only the experimental group and not the control group. Here, there were five experimental groups (the five organizations with Strategist CEOs) and five non-Strategist-led control-group organizations. As far as we can tell, this threat of *local history* is substantially eliminated by the variety in geography (multi-national), industry (six industries), and market niche of the ten organizations that cut across both experimental and control groups.

Lastly, *threats to statistical conclusion validity* may also endanger the internal validity of this study. Statistical conclusion validity concerns our ability to determine statistically significant (within a specified α level) co-variation between our independent and dependent variables (Cook & Campbell, 1979). In the focal study, the threats to statistical conclusion validity were minimized since the authors used the Spearman rank order test, which is the appropriate nonparametric statistical test, and found results that were statistically significant at the .01 level. (Note that nonparametric tests make fewer assumptions about the “normality” of the distribution and about uniform, interval distances between the numbers, and are, hence, less likely to make false assumptions.)

With regard to external validity, Rooke and Torbert’s (1998) detailed discussion of how their operationalizations reflect their action-inquiry-informed theoretical constructs minimizes many of the threats to construct—and also, by definition, external—validity. In this study, the operationalization of the independent construct is in the form of the LDP in the period of the Cook-Greuter variant of the Washington University Sentence Completion Test (Cook-Greuter, 1999). The operationalization of the dependent construct is provided by the organizational development action-logics of the Developmental Action Inquiry theory (Torbert, 1976, 1987; Rooke & Torbert, 1998) and the reliability among the three raters.

But what about the *small sample size* in the 10-organization study? Isn't that a huge barrier to claiming that the results are in any way externally generalizable to other organizations? In fact, the answer to this question is "No." The small sample size did introduce a slightly higher risk of a Type II error (falsely rejecting a valid finding), since the statistical power is slightly less than the conventional .80. But this small-sample-size effect would have affected the interpretation of the results only if a significant correlation had *not* been found. Put differently, what an *n* of 10, accounting for 59% of the variance at the .01 level of statistical significance means is just the same as what an *n* of 1,000 at the .01 level of statistical significance means... namely, that the hypothesis is not disconfirmed, with less than one in a hundred chances that the inference is in fact false.

More than that, the small *n* of ten organizations in this study means that the psychometric measure of the CEOs' and the consultants' action-logic must be valid in virtually every single case and must be a very powerful causal variable indeed. Otherwise, neither the correlation, nor the test of significance would have been so strong. Put differently, if the *n* had been 1,000 organizations rather than 10 and the result had achieved the .01 level of statistical significance, then the hypothesis would be confirmed as it has been here, but the variable (CEOs' & consultants' action-logic, as measured by the LDP) would not have been demonstrated to be as powerful a causal factor as it has been demonstrated to be in this study.

At the same time, however, it is important to remain cautious about the generalizability of the findings in two regards. Since the largest business unit in the study had 1,019 employees, we cannot know whether the findings will hold for Fortune 500 size companies. (Indeed, we expect that the CEO's action-logic alone will account for less of the variance in huge organizations and that the action-logic of the top executive team will account for more.) Also, the organizations in this study, whether for-profit or not-for-profit, are all productive, economically-oriented, work organizations; hence, the findings may not be representative of all types of organizations (e.g., spiritual organizations, temporary political campaign organizations, families, or government agencies). On the other hand, the results should be generalizable to the 95% of business and competitive not-for-profit organizations that have 1,000 employees or less. (And... since most management research is conducted in Fortune 500 firms ([partly because they are the only ones with enough margin to be able to tolerate studies of absolutely-unknown-practical-value]), this study can potentially claim greater external validity than all of them, generalizable, as it statistically is, to 95% of all for-profit and not-for-profit organizations, rather than the usual 5%.)

Construct Validity of the Current Harthill LDP

Since 2005, Herdman-Barker, Rooke, and Torbert have further redefined the rating of the Alchemist action-logic to further align the LDP rating system with Developmental Action Inquiry theory. We have included not only Cook-Greuter's (1999) criteria for what she names the "Construct-Aware" action-logic, but also her criteria for what she names the "Unitive" action-logic, as necessary elements of the Alchemist action-logic. In addition, we have identified further criteria that we believe increase the probability of validly identifying responses generated by Alchemists' post-conceptual awareness, not just by lexical cognitive complexity. These changes are based on DAI theory (Torbert, 1991) that argues that the Alchemist action-logic is a post-structural position of continuing fluctuating awareness that easily recognizes all the action-

logics from Impulsive to Elder in oneself and in social situations (for more detail, see Herdman-Barker & Torbert, 2010).

In 2008, Harthill sponsored a cluster analysis test, explicitly designed to test the construct validity test on the current Harthill LDP. The statistical technique of cluster analysis is designed to assess the extent to which a measurement tool is able to capture qualitative differences that are conceptualized in the underlying theory that the tool is trying to measure. To assess whether (and what kind of) a qualitative difference exists between Conventional and Post-conventional action-logics, according to the LDP, we analyzed the underlying pattern of two separate sub-samples: (a) 830 LDP protocols rated overall as “Conventional” (Achiever action-logic and earlier); and (b) 61 “Post-conventional” protocols ((Individualist or later). We found a striking difference between the patterns derived from these two sub-samples, illustrating the qualitative difference between Conventional and Post-conventional action-logics. (In other words, we are asking you, our readers, to attend with equal concern both to the quantitative element of this finding and to the qualitative, “presentational” [Reason, 1994] portrait of the findings below.)

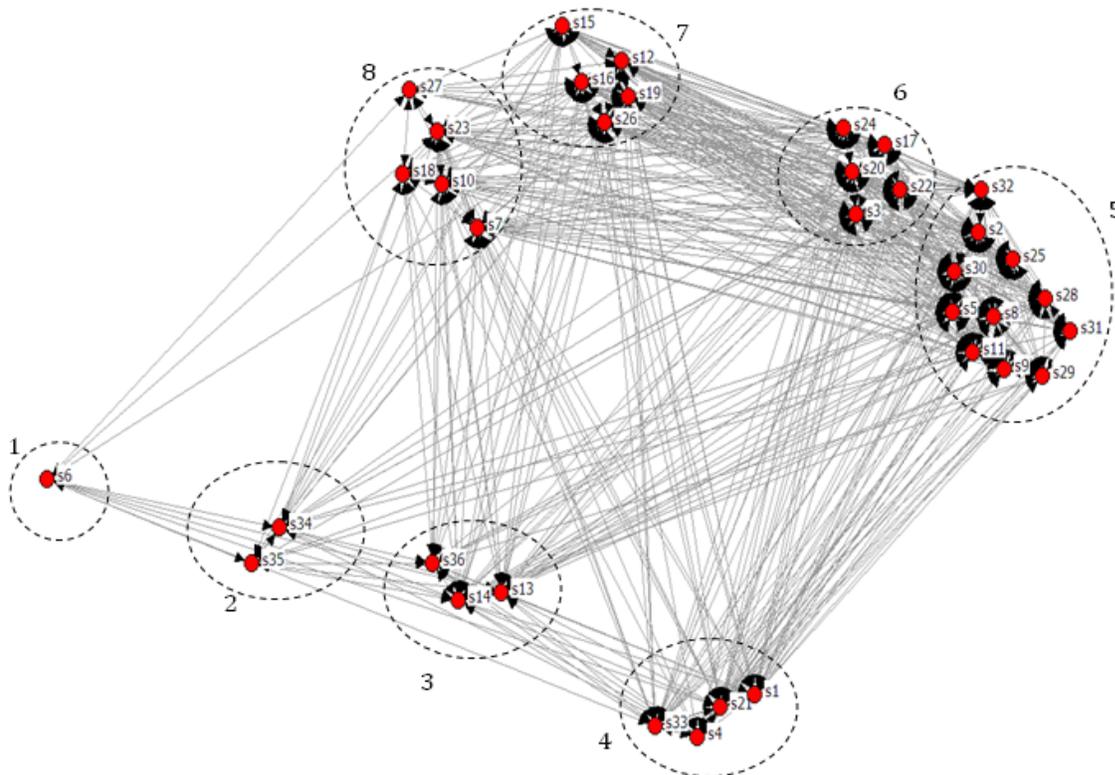


Figure 1. Cluster analysis of Harthill LDP scores on completions of 36 stems of Conventional profiles.

As Figure 1 shows, for the Conventional action-logics, stem-response ratings load on eight distinct factors, each of the eight nodes indicating a similar pattern of answers and scores. For example, stems 3, 17, 20, 22, 24 that make up cluster 6 reflect the high correlation in scores assigned to this set of stem-responses across the different respondents. Overall, this cluster analysis of the factors, or overarching themes, that emerge when analyzing Conventional LDPs

is itself quite conventional statistically: distinct clusters or factors show up, with different sentence stems associated with each distinct factor.

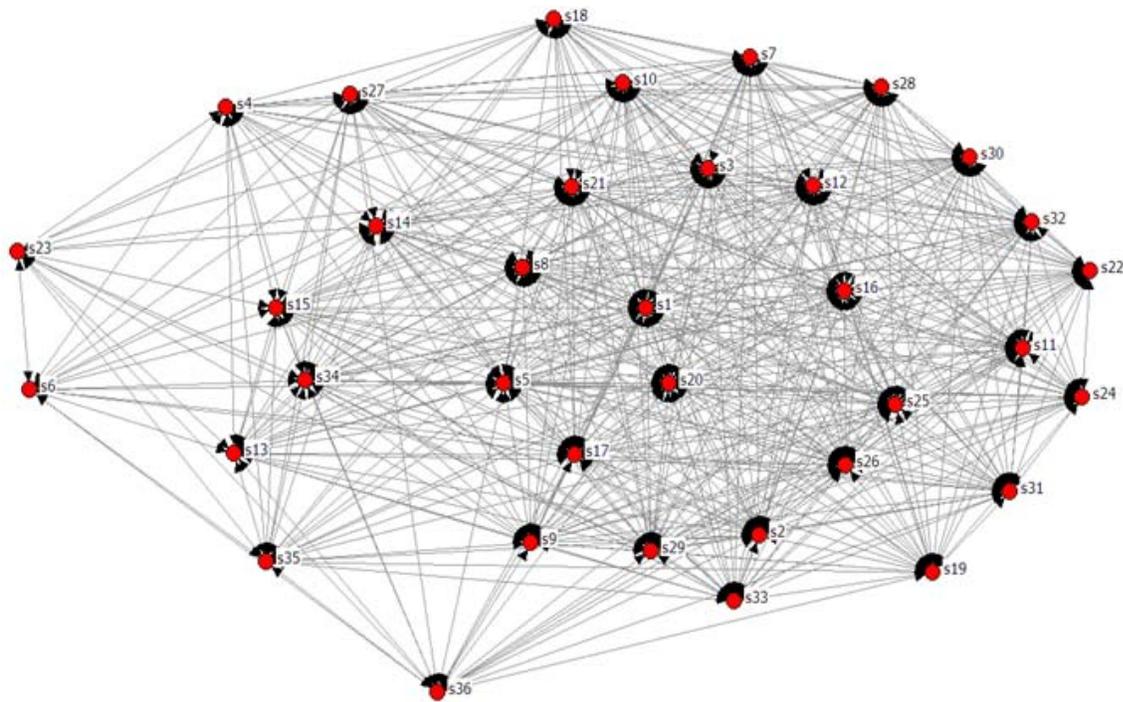


Figure 2: Cluster analysis of Harthill LDP scores on completions of 36 stems of Post-conventional profiles.

In contrast, we found a strikingly different pattern emerging from Post-conventional profiles (see Figure 2). For the Post-conventional action-logics (Individualist and later), stem-responses loaded on 11 factors, but loadings were not confined to one factor per stem. More than half (52%) of the stems loaded on two factors or more (9 stems loaded on 2 factors, 7 loaded on 3 factors, and 3 loaded on 4 factors).

These results illustrate a fundamental difference between the Conventional and Post-conventional action-logics, echoing the adult developmental theoretical foundation on which the Harthill LDP is built (Kegan, 1982, 1994; Torbert, 1991; Torbert & Associates 2004). The stably-focused Conventional loadings represent a relatively simple mental map, with Aristotelian-ly distinct, independent, lasting categories (“nothing can be both A and not-A”), as one would theoretically expect of action-logics up through the Conventional. In contrast, the complexity of the Post-conventional sets of loadings suggest that Post-conventionals hold a systems-oriented, inter-independent, “living” mental mapping process.

Plato’s two distinctive images for the nature of thought in the *Theaetetus* – as either “marks on a wax tablet” of the mind, or “birds flying about in an aviary” of the mind – seem remarkably apt as metaphorical summaries of the difference between Conventional and Post-conventional thought.

Validity of the Harthill LDP on a Case by Case Basis

Because both the scientific and the pragmatic aim of using the LDP as one aspect of *Developmental Action Inquiry* theory, method and practice is to be able to support the further developmental transformations of those persons who take the measure and seek feedback about their performance on it, it is obviously crucial that the measure be as reliable and valid as possible on a case by case basis, and not merely on an aggregate statistical basis when comparing across large groups. The most recent reliability tests, cited at the end of the earlier reliability section, are performed on all late action-logic protocols partly in order to increase the likely validity in each individual case (and the associated very high reliability statistics also support the proposition that the LDP is accurate on a cases by case basis). Even more impressive are the very high correlations achieved in several of the validity tests cited above (Study 3 and the 10-organization study), which require case by case accuracy on the part of the LDP to generate such results. In addition, two recent doctoral dissertations have worked with small samples of late action-logic ratings and have shown that the measure accurately distinguishes among late action-logics on a case-by-case basis in theoretically predicted ways (McCallum, 2008; Nicolaides, 2008).

Post-Conventional Forms of Validity Testing

In addition to all of the foregoing conventional, third-person, social scientific reliability and validity tests of the LDP, Harthill also proposes, performs, and supports post-conventional, first-, and second-person validity testing of the measure each time it is offered as feedback to individuals using the measure. First, individuals are urged to make an estimate of their own center-of-gravity action-logic (e.g., based on reading Torbert & Associates, 2004) and to treat the subjective estimate as a form of first-person inquiry, triangling with the third-person, objective metric (Hartwell & Torbert, 1999a, 19989b). Furthermore, a 200-300-word personal commentary is provided with each profile, and the recipient is invited to read it in the following spirit: “This personalized commentary has been written in a spirit of invitation and inquiry (rather than as an authoritative statement of ‘the truth’). It is intended to provide support and provocation in exploring your thinking, actions and opportunities for growth.” Writing a developmental autobiography is an additional first-person method for exploring one’s transformation across center-of-gravity action-logics during one’s lifetime to date (Torbert & Fisher, 1992).

Second, individuals who have taken the LDP are urged to seek a 2nd-person form of inquiry and triangling as well. This can be an executive debriefing session with an authorized LDP debriefer, or an action-logic estimate based on the analysis, in a small community of inquiry, of the implicit framing assumptions a person makes in a difficult, work-or-personally-related conversation (McGuire, Palus & Torbert, 2007).

On the third-person scale of large organizations, institutions, economic sectors, or political regions, the aim of the DAI approach to theory, practice, and method is to build developmental research capable of generating single-, double-, and triple-loop feedback into the day-to-day operations of the institution. This enhanced feedback in the midst of everyone’s everyday life should be associated with increasing experiences of adult developmental transformation, with an increasing prevalence of organizational transformations to late action-logics, and with a

transformation of social scientific inquiry itself toward later action-logics. Such widespread interweaving of first-, second-, and third-person development is a challenge for the future of social action and social inquiry.

Conclusion

Why is the Harthill LDP, based on the theory, practice, and method of Developmental Action Inquiry, so powerful in explaining real-life questions like which leaders succeed in supporting organizational transformation of organizations of moderate size?

We believe it is in part because of the empirical reliability and validity of the Harthill LDP as a metric, a well calibrated measure that is grounded in extensive empirical evidence of its reliability and validity, as gathered together in this article.

But the metric can only be so powerful because Developmental Action Inquiry theory describes distinctive action-logics through which persons and organizations predictably pass, as they become increasingly open and committed to integrating action and single-, double-, and triple-loop inquiry at the 1st-, 2nd-, and 3rd-person scales in the service of timely, mutually-transforming actions.

In general, what one sees in the transformation from the Loevinger WUSCT to the Harthill LDP, traced in this article, is typical of developmental transformations from Conventional action-logics to Post-conventional action-logics. First, the 3rd-person, Expert, Empirical Positivist scientific base (Torbert 2000a, b) of the original Loevinger WUSCT is preserved and enhanced over the years. Second, new, post-conventional action-logics are conceived, defined, and operationalized through Cook-Greuter's, Herdman-Barker's, Rooke's, and Torbert's work. Third, the 3rd-person measure is re-oriented so that it can play a role in a wider field where the effort is to integrate it with practitioners' 1st- and 2nd-person research and practices in the midst of daily work and life. Then it is tested in action for the rest of one's life, not least in the overlapping, de-centralized communities of inquiry one develops with friends to face the end of life together.

Thus, the Harthill LDP emerges from, and re-presents, a relatively late-action-logic Developmental Action Inquiry paradigm of social science and social action, wherein a psychometric measure is developed as-part-of-widespread-communities-of-inquiry-participating-in-an-integral-system-of-mutually-responsible-action-and-inquiry-in-the-present.

References

- Chandler, D. & Torbert, W. (2003). Transforming inquiry and action: By interweaving 27 flavors of action research. *Journal of Action Research, 1*, 133-152.
- Cohen, J. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: L. Erlbaum Associates.
- Cook, T. D. & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field settings*. Boston: Houghton Mifflin.

- Cook-Greuter, S. (1999). *Postautonomous ego development: A study of its nature and measurement*. Unpublished doctoral dissertation. Cambridge MA: Harvard Graduate School of Education.
- Erikson, E. (1959). Identity and the life cycle. *Psychological Issues, 1*, 1-171.
- Fisher, D. & Torbert, W. (1991). Transforming managerial practice: Beyond the achiever stage. In R. Woodman & W. Pasmore (Eds.), *Research in organization change and development, Vol. 5* (pp.143-173). Greenwich, CT: JAI Press.
- Fisher, D. & Torbert, W. (1995). *Personal and organizational transformation: The true challenge of continual quality improvement*. London: McGraw-Hill.
- Hartwell, J. & Torbert, W. (1999a). A group interview with Andy Wilson, founder and CEO of Boston Duck Tours, and Massachusetts Entrepreneur of the Year. *Journal of Management Inquiry, 8*(2), 183-190.
- Hartwell, J. & Torbert, W. (1999b). Analysis of the group interview with Andy Wilson: An illustration of interweaving first-, second-, and third-person research/practice. *Journal of Management Inquiry, 8*(2), 191-204.
- Herdman-Barker, E. & Torbert, W. (2010). Generating and measuring practical differences in leadership performance at postconventional action-logics: Developing the Harthill Leadership Development Profile. In A. Coombs, A. Pfaffenberger & P. Marko (Eds.), *The postconventional personality: Perspectives on higher development*. Albany NY: SUNY Academic Press.
- Herdman-Barker, E., Livne-Tarandach, R., McCallum, D., Nicolaides, A. & Torbert, W. (2010). Developmental action inquiry: A distinct integral approach that integrates theory, practice, and research in action. In S. Esbjorn-Hargens, et al (Eds.), *Integral Theory in Action*. Albany NY: SUNY Press.
- Kegan, R. (1982). *The evolving self*. Boston: Harvard University Press.
- Kegan, R. (1994). *In over our heads: The mental demands of modern life*. Cambridge MA: Harvard University Press.
- Kohlberg, L. (1963). The development of children's orientations towards moral order: I. Sequence in the development of moral thought, *Vita Humana, 6*, 11-33.
- Kohlberg, L. (1964). Development of moral character and moral ideology in M. Hoffman and L. Hoffman (Eds.), *Review of child development research, Vol. 1* (pp. 383-431). New York: Russell Sage.
- Lorr, M. & Manning, T. (1978). Measurement of ego development by sentence completion and personality test. *Journal of Clinical Psychology, 34*, 354-360.
- Livne-Tarandach, R. & Torbert, W. (2008). *One test of the validity of the Harthill Leadership Development Profile*. Unpublished manuscript. Available from torbert@bc.edu.
- McCallum, D. (2008). *Exploring the implications of a hidden diversity in group relations conference training: A developmental perspective*. Unpublished doctoral dissertation. Columbia Teachers College, New York.
- McCauley, C. Drath, W., Palus, C., O'Connor, P. & Baker, B. (2006). The use of constructive-developmental theory to advance the understanding of leadership. *The Leadership Quarterly, 17*, 634-653.
- McGuire, J., Palus, C. & Torbert, W. (2007). Toward interdependent organizing and researching. In A. Shani et al (Eds.), *Handbook of collaborative management research* (pp. 123 -142). Thousand Oak CA: Sage.

- Merron, K. & Torbert, W. (1984). Offering managers feedback on Loevinger's ego development measure. Unpublished manuscript. School of Management, Boston College. Available from torbert@bc.edu.
- Merron, K., Fisher, D., & Torbert, W. (1987). Meaning making and management action. *Group and Organizational Studies*, 12, 274-286.
- Molloy, E. (1978). *Toward a new paradigm for the study of the person at work: An empirical extension of Loevinger's theory of ego development*. Unpublished doctoral dissertation. University of Dublin, Dublin, Ireland.
- Nicolaides, A. (2008). *Learning their way through ambiguity: Explorations of how nine developmentally mature adults make sense of ambiguity*. Unpublished doctoral dissertation. Columbia University Teachers College, New York.
- Peterson, L. (2008). Clinical "significance:" "Clinical" Significance and "practical" significance are not the same things. Paper presented at the Annual Meeting of the Southwest Educational Research Association (New Orleans, LA, Feb 7, 2008).
- Reason, P. (1994). *Participation in human inquiry*. London: Sage.
- Reason, P. & Torbert, W. (2001). Toward a transformational social science: A further look at the scientific merits of action research. *Concepts and Transformation*, 6(1), 1-37.
- Rooke, D. & Torbert, W. (1998). Organizational transformation as a function of CEOs' developmental stage. *Organization Development Journal*, 16(1), 11-28.
- Schutt R. (2004). *Investigating the social world, the process and practice of research*, 4th ed. London: Pine Forge Press.
- Rooke, D. & Torbert, W. (2005) Seven transformations of leadership. *Harvard Business Review*, April, 66-76.
- Starr, A. & Torbert, W. (2005). Timely and transforming leadership inquiry and practice: Toward triple-loop awareness. *Integral Review* 1, 85-97.
- Stein, Z., & Heikkinen, K. (2009). Models, metrics and measurement in developmental psychology. *Integral Review*, 5(1), 3-24.
- Torbert, W. (1976). *Creating a community of inquiry: Conflict, collaboration, transformation*. London UK: Wiley Interscience.
- Torbert, W. (1987). Education for organizational and community self-management. In S. Bruyn & J. Meehan (Eds.), *Beyond Market and State* (pp. 171-184). Philadelphia PA: Temple University Press.
- Torbert, W. (1991). *The power of balance: Transforming self, society, and scientific inquiry*. Thousand Oaks CA: Sage.
- Torbert, W. (1994). Cultivating post-formal development: higher stages and contrasting interventions. In M. Miller & S. Cook-Greuter (Eds.), *Transcendence and mature thought in adulthood* (pp. 181-203). Lanham MD: Rowman & Littlefield.
- Torbert, W. (2000a). A developmental approach to social science: A model for analyzing Charles Alexander's scientific contributions. *Journal of Adult Development*, 7, 255-267.
- Torbert, W. (2000b). Transforming social science: Integrating quantitative, qualitative, and action research. In F. Sherman & W. Torbert (Eds.). *Transforming social inquiry, transforming social action* (pp. 67-92). Boston MA: Kluwer Academic Publishers.
- Torbert, W. & D. Fisher (1992). Autobiographical awareness as a catalyst for managerial and organizational development. *Management Education and Development*, 23, 184-198.
- Torbert, B. & Associates (2004). *Action inquiry: The secret of timely and transforming leadership*. San Francisco CA: Berrett-Koehler.

- Torbert, W, & Martinez, S. (in press). Toward a theory and practice of timely inquiry and action. *Journal of Action Research*.
- Vaillant, G. & McCullough, L. (1987). The Washington University Sentence Completion Test compared with other measures of adult development. *American Journal of Psychiatry*, 144(9), 1189-1194.
- Webb, E., Campbell, D., Schwartz, R. & Sechrest, L. (1966). *Unobtrusive measures: Nonreactive research in the social sciences*. Chicago: Rand McNally.
- Westenberg, M., Jonckheer, P., Treffers, P. & Drewes, M. (1998). *Personality development: Theoretical, empirical, and clinical investigations of Loevinger's conception of ego development*. Mahwah NJ: Lawrence Erlbaum.

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Toward Integral Higher Education Study Programs in the European Higher Education Area: A Programmatic and Strategic View¹

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Abstract: This essay somehow arbitrarily freezes my ongoing attempt to grasp the present situation and future possibilities of higher education courses, programs, institutions and initiatives that are inspired by integral and likeminded approaches. The focus in this essay is on the European Higher Education Area and its specifics, whereas some implicit or explicit comparisons with the USA are made. My reflections are triggered by the recurrent observation that in Europe there seems to be i) more demand than offer of integrally oriented higher education programs, ii) an imbalance between overused but little successful and underused but potentially more promising strategies to implement such programs, iii) little or no learning from past failures, and iv) little mutual awareness, communication and collaboration between different activists and initiatives in this field.

The context for this essay is i) the current societal macroshift, ii) the unfolding of academic level integral and likeminded research worldwide, and iii) the large scale reform of the European Higher Education systems brought about by the Bologna process, its (false) promises and the potential it nevertheless has for realizing examples of a more integral higher education. On this basis the consequences for attempts to overcome a relatively stagnant state of affairs in Europe are discussed. Given that; most past attempts to implement programs inspired by an integral worldview have failed from the start, or disappeared after a relatively short period, or are marginalised or becoming re-mainstreamed, this essay aims to devise a potentially more promising strategic corridor and describes the contours of the results that could be brought about when following a developmental trajectory within this corridor. This futurising exercise is inspired by principles shared by many integral and likeminded approaches, especially the reconsideration, integration and transcendence of premodern, modern and postmodern structures and practices of higher education.

This essay is programmatic and thus deliberately combines facts and values, past and future, summaries of first person observations and third person factual information, without the burden of systematic referencing required by scholarly writing. It does not claim to replace empirical surveys which, however, are still lacking to date regarding the actual state of affairs of higher education inspired by integral and likeminded approaches in Europe. Accordingly, at this stage, the essay is an exercise of awareness-raising to stimulate more and better collaboration across streams, disciplines and countries between those scholars, students and activists who are already inspired by integral and likeminded

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approaches and interested or already engaged in developing and sustaining higher education programs according to a more integral spirit.

Keywords: Andragogy, European Higher Education Area, higher education, implementation, integral and likeminded approaches, knotworking, learning communities, macrosift, project-based learning, service learning, strategy, study programs, transformation, vocation.

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Acronyms

In this paper the following four acronyms are used:

ILA = Integral and Likeminded Approach

HESP = Higher Education Study Program

HEI = Higher Education Institution (regardless of the more specific type like university, institute of technology, institute of teacher education, polytechnic, business school, art school etc.).

EHEA = European Higher Education Area

The first and the second acronym have been created because of their frequent use in this paper, the third and fourth are widespread official acronyms.

Overview

We believe the next transformation will give rise to the integrative university or transversity representing the next stage in evolution from the university and multiversity. The transversity is a new institution that will be multi-dimensionally connected not only within and across disciplines, but across cultural boundaries and across barriers to the broader society that separate it from primary education, industry, business, government and other institutions. These integrative universities will become living institutions in which organizational structure and patterns of behavior provide permeable boundaries to the outside community with fluid internal boundaries that allow people and resources to coalesce around prominent issues, opportunities, and challenges. These changes will enhance the exchange of research expertise and practical knowledge between universities and society. (Awbrey & D. K. Scott, n.d.)³

What is needed now is a kind of university that has never existed before.... I propose that we can and should remake the university so that it becomes an intentional force for good in the world. Such a project runs counter to the kind of academic analysis that is modelled in the university today, for it is a project informed by care and passion and developed from within a distinct philosophical commitment and political interpretation. (Ford, 2006, pp. 8-9)⁴

We are facing tremendous opportunities and threats, individually and collectively, in today's increasingly complex, interrelated and dramatically changing world. Globalisation and the associated far-reaching developments across all domains make heavy demands on almost all of us, and opening up new opportunities at least for some. Overall, we are experiencing and co-producing a growing rate of change not only impacting ourselves, but so many future generations such as has never occurred before in the history of humankind. In Europe and other parts of the world we are already in the midst of a profound and irrevocable cultural transformation which is not only an economic or a technological one, but a macro shift (Laszlo, 2001) concerning the dominant worldviews, lifestyles, life worlds, and their governance. Only two or three times since the dawn of the species *Homo sapiens* on planet earth did human societies undergo such a profound transformation. Through the second wave of globalisation in the last 20 years or so we are on the way to a new societal formation beyond the industrial nation state model. Some are inclined to perceive this as a lethal global crisis – for many good reasons linked to data-based mega-trends – others as the possible dawn of a new, more inclusive and peaceful planetary civilisation – for other good reasons more linked to vision, values and creativity. Whether the unprecedented accumulation of intractable problems or the upcoming wave of new opportunities is highlighted depends on one's position, perspective and temper. It might be wise, however, to keep closely in touch with both, as do integral and likeminded approaches (ILAs).

³ Scottish-born nuclear physicist David Scott was Director for Research at the Cyclotron Laboratory, Vice President for Academic Affairs, and Professor of Learning, Science and Society at Michigan State University, and then served as Chancellor of the University of Massachusetts at Amherst 1993-2001.

⁴ Marcus P. Ford is Professor of Humanities at Northern Arizona University and serves in the integrative Comparative Cultural Studies program.

Scientific research, through its technological and technocratic outlets⁵, has been one of the most important enablers and amplifiers of the earlier and the contemporary wave of globalisation. Unfortunately however, the educational and ethical aspects of scientific developments are lagging behind the technological ones which found their way into practice much quicker.⁶ For this reason academia has today the prime responsibility to support individuals, organisations and societies through appropriate research, higher learning and service to communities to understand and utilise the high level of complexity of this macro-shift as productively, sustainably and inclusively as possible. Many ILAs are foregrounding individual development and collective evolution in a multidimensional and emancipatory perspective. When facing uncertainty and standing on shifting sands, as we all actually are today, they appear as suitable and timely contributions for inspiring higher education for the 21st century.

It appears, however, that there are major obstacles to an implementation of higher education study programs (HESPs) inspired by ILAs. In order for implementation to meet the breadth and depth of contemporary challenges and the speed of actual change, various issues must be overcome. For example institutional inertia and hyper-specialisation deeply inscribed into the structures and mentalities of academia on the one hand, and lack of professionalism and strategic collective power in many upcoming projects and initiatives based on ILAs on the other hand. Another factor playing a role are the low levels of communication and collaboration between streams representing different ILAs which generally tend to emerge as rather self-contained communities. The overall consequence is a considerable lack of overview, grounding, potential insight, mutual constructive criticism, and practical synergies. As a result, the absolutely crucial shift towards locally and globally sustainable lifestyles is much less than optimally stimulated and amplified by higher education and research. Therefore, leaving aside differences in emphasis, most ILA-inspired thinkers and activists would agree that the agenda of today's mainstream higher education and research needs to be complemented, broadened, and reorganised in order to be able to reasonably tackle the new requirements related to the current macroshift.

Through European, and later North Atlantic imperialism, modern Western universities have become the globally dominant model of higher learning and of the definition of valid and useful knowledge. They have been profoundly shaped by, and instrumental to the development and stabilization of industrialized nation-states. The current global challenges and the globally emergent designs of knowledge-based, networked living and working bring about a new, unprecedented societal formation. On the one hand this formation strongly depends on even more powerful "knowledge" institutions. On the other hand many existing higher education institutions (HEIs) are considerably challenged by digital media, cultural / linguistic diversity, post-materialist values, transdisciplinary problem-solving demands, demographic shift, ultimate massification and accountability towards an ever larger array of stakeholders. In addition, they are particularly challenged by the strengthened competition between each other and with more

⁵ Like transportation systems, fossil and nuclear energy production, military technology, information and communication technology, management fads, sustained political and economic ideologies, and the new horizon of genetic engineering.

⁶ Coined in one of Albert Einstein's catch phrases as "It has become appallingly obvious that our technology has exceeded our humanity."

agile competitors like continuing education providers, virtual and corporate universities, and with institutional less or unbounded knowledge production and dissemination over the Internet.

Consequently, traditional HEIs are under pressure and need to adapt and change to become hosts and catalysts of adequate higher learning in this century. All this being said, new models of HESPs are called for, building on, reorganising, extending and transcending current structures and practices of higher education, models that embrace dialogical, plural and integrative practices regarding the worldwide quest for knowledge, wisdom and appropriate practice in midst of turmoil, breakdowns and difficult to track new emergent patterns. HESPs inspired by ILAs can and should play a substantial role in this transformation. Until today, however, the (although limited) institutionalised offers in the USA are not equalled by anything comparable in the upcoming European Higher Education Area (*EHEA*). Both areas of higher education show up with a comparable number of students and HEIs. They are the two largest ones in the world,⁷ and the hosts for the largest proportions of all international students worldwide. Given that many of the historical lead figures of ILAs are Europeans or learned from Europeans there is one more good reason to push the development of HESPs inspired by ILAs in the EHEA. The goal then is to reach levels of program implementation corresponding to the existing potential in terms of academic teachers and students already now inspired by or interested in ILAs, but lacking academic contexts resonating with their aspirations and vocations. For this to happen the pervasive strategies of curriculum design and organisational set-up of new HESPs need to be rethought and refocused. As a requirement, the new conditions for running HESPs, generalising with the realisation of the EHEA, have to be considered thoroughly as they are partly a barrier and partly a potential vector for creating more integral approaches to Higher Education in Europe. On this basis innovative models can emerge in the interstices of the long-standing and inert structures and practices of higher education, hopefully anticipating and exemplifying a more general transformation.

Contexts

Without a global revolution in the sphere of human consciousness nothing will change for the better in the sphere of our being as humans and the catastrophe toward which the world is headed – whether it be ecological, social, demographic or a general breakdown of civilization – will be unavoidable. (Havel, 1990)⁸

In this section the ground will be prepared for the strategic reflection in the section on Strategies by considering a range of contextual influences on higher education, research and integral approaches in Europe and beyond. Specifically, transformation in society and the rise of integral consciousness, the evolution of research paradigms, and the realization of the European

⁷ With China strongly catching up since the turn of the millenium and India already being quite strong.

⁸ In his address to the United States Congress, Washington, February 1990. Václav Havel is a writer, dramaturge, and politician. He was one of the major critics of the Soviet regime and an important activist in the velvet revolution of 1989 upon which he became president for 14 years, first of Czechoslovakia and then of the Czech Republic. For both his literary and political work he received numerous awards. A cross-cutting theme in his writings is the alienation and fragmentation of the life of the modern human being determined by science and technology which have taken the place of the Highest.

Higher Education Area. Those who feel already well acquainted with one of these contexts can skip the respective subsection without hampering the understanding of the following main sections (Strategies and Contours) containing the core arguments of this paper.

Transformation of Society and Rise of Integral Consciousness

Historically, in Western societies there has been an evolution from an almost pervasive dominance of the religious over other societal domains (politics, economy, knowledge and media) to a relative or in some countries absolute separation between the church and the state. This transformation enabled the deployment of scientific inquiry that is unthreatened and unconstrained by religious dogmatism and so gave rise to modern science and higher education, fuelled by the competition between the collection of medium-sized and small countries on the European peninsula. More generally, a cognitive revolution occurred in the Gutenberg era through more widely available print publications and through the introduction of mandatory schooling of entire populations. The industrial revolution, however challenging it was for those directly involved in it, ended up with higher living standards and life expectations, and the development of democratic regimes guaranteeing women's and minority rights etc. in what is called the Western world. Through the process of secularization the impact of religious institutions declined as well on the life of the average individual. Today, in certain geographical areas in Europe traditional local faith communities are threatened with disappearance. At the same time a patchwork of new "spiritualities" has been emerging. Rational science, powerful technology and material abundance of the broad middle classes of Western countries apparently has not ruled out transcendent aspirations as earlier proponents of the Western-style enlightenment project would have expected. Nevertheless, in most parts of Europe, an enduring uneasiness in the relationship between science and spirituality resulted from these historical processes.⁹

From the internally fractured and blood-saturated European soil not only the cognitive and industrial revolutions were expanded globally, but as well colonialism and the two world-wars. Colonialism, nationalism and war cannot be separated from the Western enlightenment project which, in Immanuel Kant's¹⁰ famous definition was meant to be "man's leaving his self-caused immaturity" towards the enactment of the values of the French and other revolutions, freedom, equality and solidarity. Colonialism, nationalism and war have been Western enlightenment's continuous condition, companion and shadow-side. And they still are, just in different disguises, as today, on a global scale, some are much more free and equal than others, and some are

⁹ Compared to the USA, lower levels of attendance of faith communities and of communication between science and religion can be observed in most European countries in which different historical trajectories have produced similar results: whether in the radical French state secularism in which spirituality is banned from the public sphere, including schools and universities, whether in Germany where 12 years of Nazi regime were sufficient to create a transgenerational suspicion regarding everything not appearing neatly rational at first glance, whether in several Eastern European countries under former Communist rule in which atheism became the new state religion and which survived the fall of the Soviet regime in the attitudes of important sections of the population.

¹⁰ As a case in point, Kant's otherwise ingenious world-centric life work is not at all free from Prussian cultural chauvinism.

included whereas others are excluded from the circle of solidarity and care. We are lucky of course that the Cold War, artificially forcing Europe and the whole world into two ideological camps, East and West, communist and capitalist,¹¹ did only almost but not actually explode into a hot nuclear third world-war. But as a matter of fact we don't need to wait for the third world-war as it is already taking place day after day, through the neo-colonial socioeconomic imbalance and injustice between the global North and the global South which is structurally reproduced on the basis of the historical world-system put and kept in place by the North Atlantic nations. Accordingly, not only the material conditions are highly asymmetric, but as well the geopolitics of knowledge. Knowledge and power goes rather one-way from the global North to the global South whereas migration (brain drain) and resources go the reverse way. What is lost in the middle is dignity of life for the (much too) silent majority of humankind, and the ecological balance of great many natural habitats, including the global habitat of the globalised humans themselves.

Given the deep implication of generations of Europeans in these historical dramas, directly or indirectly, intentionally or unintentionally, it has come somehow as a miracle that now, as an ongoing political, economic and sociocultural project, the very first transnationally integrated society of the planet is shaping up step by step in the last 50 years on the European peninsula: the *European Union* has become an undeniable reality despite the waves of developmental crises it is undergoing and despite frequent contradictions between great ideas and weak realizations.¹² Some of the hallmarks of the current transition in European countries and elsewhere from industrialised nation-states towards a transnational or eventually global networked society are:

- The high impact of major breakthroughs in physics, genetics and information technology and their associated technological opportunities and threats;
- A quick and profound demographic shift with far-reaching consequences through dropping birth rates, further rising life expectation and highly controlled immigration, producing a rapidly ageing society;
- A growing instability of the global financial and economic system and growing socio-economic inequalities between social classes and between prospering and declining regions, between employed and unemployed, coupled with persistent and ever more rising public debt;
- An extreme dependency on the availability of fossil energy carriers whose availability is declining, and a generally completely unsustainable lifestyle and associated long-term ecological degradation, some of which has already become irreversible, as reflected by global climate change, loss of biodiversity and fertile soils, accumulation of dangerous chemicals and nuclear particles in the environment and in the food chain;
- Wide-spread health problems typical for (post-)modern societies (cardiovascular diseases, obesity, diabetes, addictions, depression, burn-out, ...) despite a medically highly sophisticated health care system and high life expectations.

¹¹ Very much paralysing as well the States of the Non-Aligned Movement who precisely tried to escape from it.

¹² As well as some well-realized bad ideas like export subsidies for European agricultural products destroying local agricultural markets in countries the EU is claiming to support in their development.

- Threats for the Western-style democracies by new religious fundamentalisms, global terrorism, political populism and most of all, frustrated disinterest of a growing number of non-voters.
- Repeated attempts at economisation of all spheres of life (and Westernisation of all cultures) in terms of the dominance of one worldview and lifestyle over all other worldviews and lifestyles.

In the face of these developments, the political inertia and lack of collective anticipatory learning made us lose the period of more than a generation through inaction, insufficient or inadequate action despite well substantiated early and recent warnings.¹³ The systemic incapacity of most contemporary decision-makers to influence any of these global trends substantially is becoming more and more evident. However, there is a growing awareness of all these developments among those who are well-educated and critical, and many are starting to realize that these trends taken together are going to have disruptive effects, and that many of the measures implemented are often rather part of the problem than of the solution.¹⁴ The part of the measures that could be helpful is generally implemented too late, too slowly, too modestly and too unsystematically. The more overarching visions for a plan B¹⁵ come from outside the centres of power and decision making and infiltrate them only in downshifted and fragmented versions. What makes things really embarrassing is that apparently there is no plan C (preparing for *catastrophes*) or D (generalised *disaster* management) even though this is likely what is needed in this century. The goals of the political realists are rather coined in terms of “reducing the acceleration of the growth of ...” (many issues can be filled in the slot: public debt, global warming, uncontrolled proliferation of nuclear weapons etc.) The dominant discourse is that there is no alternative to the overall path of socioeconomic “development,”¹⁶ and the idea is that growth can now somehow miraculously become green growth. Undifferentiated notions of growth and development are and remain the long-time favourites of verbal narcotics in political discourse and action across countries and political parties that are immune against contrary evidence (Rist, 2002). Under these conditions the UN millennium development goals,¹⁷ coined in

¹³ The report to the Club of Rome “Limits to Growth” (Donella H. Meadows, Dennis L. Meadows, Randers, & Behrens, 1974) that has become a bestseller in many countries being a major case in point. But until today, as the 30-years update of this report shows (Donella H. Meadows, Randers, & Dennis L. Meadows, 2004) or Ervin Laszlo’s (Laszlo & Seidel, 2006) take on the same issues, actual action is lagging behind available and more and more specified insight and action potential. See as well footnote 15.

¹⁴ The way the current globalised financial crisis is tackled is a case in point which will amplify international imbalances, future global problems, and intergenerational injustice.

¹⁵ Many Plan B’s have actually been devised until most recently, in scientific (Rockström et al., 2009) and in popularized (Brown, 2009) versions, but as they all imply substantial changes in Western consumerist lifestyle they linger at the margins of actual political action, even though certain political discourses start to rhetorically take up some of those Plan B elements that appear less threatening to the electorate (and to political careers).

¹⁶ This is perhaps the biggest case ever of a TINA (“there is no alternative”) – formation. TINA-formation is a term Roy Bhaskar has introduced in his work, referring to Margret Thatcher’s famous expression, as an invitation to forcefully and intentionally explore the alternatives to “no alternatives” (Bhaskar, 2002, pp. 202-204).

¹⁷ www.undp.org/mdg/basics.shtml

the same terms, are more than likely to remain utopian even when considerably stretching the deadline that has been fixed (2015).

Actually, to run “business as usual” “without an alternative” equals being a generation which is unabashedly living on the basis of the heritage of its children and grand-children rather than the other way round. The fact that this is now happening on a global scale is a historical first. This alerting reversal, if continued, unmistakably foreshadows an “end of civilization as we know it” – scenario (e.g. Diamond, 2005). The causes for this likely scenario are known by many of those who bring it about before the breakdown has actually taken place on a broader scale – this is another historical first. An array of curative and preventive measures are known and at least partly available but not (sufficiently) employed – this is a third historical first. These three historical firsts combined make humankind very much appear as travelling on planet earth as a suicide bomber.¹⁸ On this basis there is one big unanswered question, and it is unanswered because it is taboo to ask it in the first place: How to act appropriately after it’s too late?

In this overall context the European Union, through its Lisbon strategy¹⁹ and its reform treaty²⁰ wants to strengthen its path towards a transnational, sustainable, open and inclusive society but, at the same time, become the most competitive and innovative knowledge economy of the world. That goal is stated in the nowadays pervasive economic slang. But even when striving for alternative futures in alternative terms, there is a large consensus that research, innovation and lifelong learning are key. What is rarely considered, however, in European policies – and in other regions either – is that the current challenges cannot be overcome by learning and innovating more and faster in any linear way. There is little awareness yet that the core issues of societal macroshift need to be addressed on the much deeper meta-paradigmatic level of worldviews. Only then can the contemporary predominance of partial perspectives and of specific levels (national) and domains (economy) become more balanced. This requires a deep, multidimensional transformation.²¹ This transformation cannot be caused in any straightforward way, though. However, it is possible to create and cultivate organisational and educational environments that are more receptive and conducive for its emergence than this is generally the case.

As a proxy for this transformation we can look at empirical research on values change.²² This line of research has quite consistently shown that the distribution of value systems held by

¹⁸ There is generally much indignation, and rightly so, when people called terrorists employ a similar approach on a much smaller scale and harm or kill innocent bystanders and children. The lack of indignation regarding our own involvement in collectively employing the same approach on a much larger scale is striking and shows that the mirror image is not understood.

¹⁹ http://europa.eu.int/growthandjobs/key/index_en.htm

²⁰ http://europa.eu/lisbon_treaty/index_en.htm – after years of intensive struggle and contestation the reform treaty is just now entering into force. For the new lighthouse positions of a President of the EU Council and of a High Representative for Foreign Affairs which the treaty creates two politicians almost totally unknown to the European and world public have been appointed.

²¹ Or even more deeply, a *mutation*, as Jean Gebser (1985) contended.

²² Like the World Values Survey (www.worldvaluessurvey.org), and the European Values Study series (www.europeanvaluesstudy.eu), among many more specialized or geographically more limited studies.

specific sections of the population is shifting in time. It appears that in the last generation or so a growing percentage of the population of Western countries identifies with post-materialist values. This section starts to represent a separate force, distinct from religious traditionalists and secular materialists – or at least would represent a separate force if more mutual awareness and coordination was established. Individuals identifying with post-materialist values tend to be more interested in quality of life than standard of living, psycho-spiritual development than material security, relational care than untempered competition, cultural diversity than identity politics, environmental protection than exploitation of nature, social justice than domination.

This (inter-generational and to a certain degree intra-generational) values change in a section of the population is probably too recent to attract wider awareness, but it is empirically undeniable. In many countries the growing proportion of the population holding and enacting post-materialist values is not yet properly represented in the post-war system of political parties and does not yet have a substantial impact on the existing public educational provision. But as a matter of fact it has a different pattern of consumption and is quite active in cultural production and civil society organisations. These people holding post-materialist values actually become more and more organised in multiple groups, networks, projects and training programs. Mostly this occurs outside formal political and academic contexts in informal meetings, associations, and settings of coaching, consulting and alternative adult education. Many of these initiatives are often still largely isolated from each other and unaware of their commonalities, especially across domains, streams and countries. But day after day there are more of them.

Conclusion

Vaclav Havel's contention introducing this section says it all: either we are bringing about a leap in consciousness and substantial transformation of our post-war consumerist Western lifestyles within a generation or civilisational decline if not cataclytic breakdown will take over. The time window for this to be catalyzed is shrinking very quickly, and in many respects it is already too late. There are signs, though, that the leap in consciousness has indeed started to take place in growing sections of Western populations and elsewhere, and that these sections are among the best-educated, critical, spiritually interested, and engaged in civil society initiatives. However, there are too few educational opportunities yet reflecting and enhancing their values, attitudes, knowledge quests, practices and lifestyles (especially so in publicly recognized forms of higher education). On this basis the need for information and knowledge, discussion and networking, training and competencies, research on and practice of ILA's is already sensible and is very likely to grow steadily in Europe and elsewhere.

Today, there is no other reasonable way to influence the (true but partial) rationalistic, science-based, and technologically propelled power base of the Western world than to target in its heart: the scientific enterprise and its underpinnings. Transforming academia from within is necessary because the techno-scientific power-base in its current globalised performances reveals severe (self-)destructive tendencies. It is very efficient with regards to isolated processes but evidently very little effective with regards to cross-cutting issues, higher purposes and long-term sustainability (Maxwell, 2007). As a consequence ILAs have to make inroads into academic research and training or they go nowhere, and higher education thus goes nowhere as well.

Evolution of Research Paradigms

The creation of our current global problems, and our inability to respond adequately to these problems, has much to do, in other words, with the long-standing, rarely noticed, structural irrationality of our institutions and traditions of learning, devoted as they are to acquiring knowledge dissociated from learning how to tackle our problems of living in more cooperatively rational ways. Knowledge-inquiry, because of its irrationality, is designed to intensify, not help solve, our current global problems. Inquiry devoted primarily to the pursuit of knowledge is, then, grossly and damagingly irrational when judged from the standpoint of contributing to human welfare by intellectual means. At once the question arises: What would a kind of inquiry be like that is devoted, in a genuinely rational way, to promoting human welfare by intellectual means? I shall call such a hypothetical kind of inquiry wisdom-inquiry ... (Maxwell, 2007, p. 103)

To understand the unique contributions to higher education ILAs can make it is necessary to mention some features that became powerful forces in mainstream versions of academic research and higher education: hyper-specialisation, scientism, but as well worldview revolutions generated by scientific research itself.

The flourishing of specializations can be considered the single most important and most pervasive structural feature of the research and higher education systems from the 19th century onwards until today (Becher & Trowler, 2001). The number of institutionalized disciplines and sub-disciplines grew almost exponentially, and today we arrived at approximately 10,000 recognized research fields. Interdisciplinarity, by the way, is not a new buzzword at all, but a pretty old claim, historically arising almost together with disciplinary and sub-disciplinary specialization. However, the call for and practice of interdisciplinary endeavours has rather added to than remedied the rapid proliferation of compartmentalized pockets of knowledge generation, because it is creating uncountable new cross-over niches, hybrid sub-disciplines and many temporary projects not leaving any new imprint, coordinated perspectives or conceptual integration. The disciplinary structure and its interdisciplinary sibling help to create professional identities and cross-generational lineages at the price of decreasing societal usefulness of the knowledge produced, even more so as facts were often separated from values.²³ This drift towards scattered and “value-emptied” knowledge has reduced the possibility to communicate results beyond the small community of fellow specialists and to derive helpful recommendations for and co-operations with practitioners and policy makers.

Scientific inquiry as practiced in many of the contemporary institutional settings of higher education and research in this spirit often turns out to be scientific dogmatism (scientism) when challenged by phenomena and arguments not fitting right away in the dominant frameworks and their unquestioned background assumptions, be they modernist or postmodernist. Scientism is rather unscientifically restricting the range of legitimate questions, methods, theories and fields of inquiry. Scientism in less obvious forms seems respectable in many research communities and

²³ As if the selection and construction of facts is not guided by values, as if relying on facts is not a value in itself, and as if one could remain neutral regarding certain facts.

beyond. It is part of the strategic game of rhetorical and institutional delimitation of “true science” from other forms of generation of insight (like practical knowledge, spiritual experiences, or worldviews from non-Western cultures) – as if there could be a completely neat split. This continuous attempt to make academic science special – and superior – often lacks reflexivity, and doesn’t reflect what makes scientific research truly specific in terms of an undogmatic, pluralistic, rational, transparent and reflexive mode of inquiry. It doesn’t sufficiently take into account that the practice of the academic researcher is embedded in a multi-layered knowledge quest co-determined by a-rational intuitions, personal themes, and cultural metaphors. And it doesn’t consider the whole impact of worldview revolutions that scientific research has produced by itself, and which show the limits of understanding and dealing with reality in terms of scientism.

If the quantum revolution has shattered the mechanistic worldview in the sciences in the early 20th century, the postmodern and reflexive turn has shattered any myth of the given in the humanities and the social sciences in the late 20th century. It appears that data is observer and theory-dependent, that language, metaphor, and cultural communities of practice play a major role in interpretation and sense-making, that there is a diversity of rationally defensible paradigms which don’t go away with scientific discoveries and advances, and that the link between knowledge and social power relations cannot be denied. Accordingly, post-positivist research approaches have gained influence, and the call for a more self-reflexive practice of scientific research has started to spread and to become normative, at least in the social sciences.

Interestingly, many proponents of quantum physics²⁴ and of variants of post-modern philosophy²⁵ came close to a post-conventional (proto-)spiritual worldview when pushing their genuine approaches to the limits. They touched a hyper-rational / trans-rational scientific / spiritual vision of reality, and couldn’t do otherwise when following the internal contradictions of their respective approaches from within. In a nutshell it could be said that they naturally arrived at the entry point of an ILA. As they can be seen as forerunners and expressions of a wider cultural transformation it can be assumed that in the near future a significant proportion of scholars and academic teachers will struggle to follow them up to that point and beyond. A promising number of smart students seem to be faster on track in this direction than many of those formally in charge to teach them.

ILAs are actually going beyond the limitations of scientism and reductionist (but as well older holistic) visions and approaches, beyond the dissociation of science and spirituality which is specific to the Western world and gave rise to modern science in the first place (see the section on contours), but as well beyond extreme relativism widespread in research communities infused by postmodern thought. To be clear, ILAs are neither opposed to specialised research nor to cultural diversity. They are widely drawing and relying and residing on both. They are just opposed to the striking imbalance between specialised and boundary-crossing research, between

²⁴ E.g. Max Planck who said: “I have become a believer because I have been thinking until the end of thinking. We all stop our thinking much too early.”

²⁵ E.g. Gilles Deleuze’s “productive void,” François Lyotard’s “black void,” Jacques Derrida’s “absolute secret” – for a thorough treatment and further examples see Benedikter (Benedikter, 2006) or an early online draft thereof on <http://www.integralworld.net/benedikter1a.html>.

empirical studies regarding specific limited contexts and meta-studies. They are heading towards post-metaphysical and post-disciplinary meta-theories and “integrally informed” action derived from the recognition of all the partial but complementary worldviews, perspectives, theories, and methodologies from natural and social sciences, humanities, arts and spiritual traditions. In integral approaches scientific, artistic and spiritual disciplines are generally equally respected for exploring intertwined realms and layers of reality.

As far as I can see it between the 1850s and the 1950s more than a dozen original thinkers from different continents, thought traditions and cultural contexts introduced “integral” as a core term and as an approach of a more encompassing kind. When doing so most of them didn’t know of each other. Among them were many cosmopolitan Europeans. The fact that ILAs were born in multiple, independent streams with their specific but overlapping emphasises can be interpreted as a typical phenomenon of emergence.²⁶ This multi-local emergence is not widely known, not even by researchers inspired by one or the other brand of an ILA. Many of them tend to reproduce the partial historical picture storied in the stream they identify with. Some of these streams have been born inside, some outside, some at the margins of academia. In addition, many other streams having chosen other labels²⁷ can be considered complementing, resonating and overlapping with those that have become known as “integral” approaches. Since the 1970s a new wave of ILAs unfolded, once again in multiple streams. Today, we can look at and take advantage of a richly textured ecology of ILAs provided that cross-stream scholarly communication and reflexivity becomes more strongly developed. This is not yet the case to an extent which would be adequate in face of the globally available treasures brought to us by ILAs.

This stands in some contrast to the core motivation of ILA’s that can be seen as attempts to take into account and relate major dimensions of reality and human life to each other across and beyond paradigms, disciplines, cultures and eras. Today, it is possible for the first time in history to simultaneously access great many worldviews and practices humanity has developed and made use of in various places and contexts for various purposes. As a consequence, in today’s rapidly globalising knowledge sphere, we can consider them in conjunction as a heritage of humanity and critically reappraise them in the light of contemporary scientific research, higher learning and societal challenges.

For this to happen, we need to bring about a new step of maturation of research and higher education and to leave behind the still dominant scientific propensity to grasp and explain reality through the lenses of basically reductive models and methods. ILA’s are generally designed to complement and transcend hyper-specialised and reductionist research and education. Our times demand neither the perpetuation of eclectic pluralism or relativism, nor monistic fusion of everything into one unified theory which risks to be disrespectful of the knowledge already generated through the domain-, discipline- and paradigm-specific developments fruitfully going on for decades and centuries.

²⁶ The reconstruction of the cross-cultural and multi-stream historical unfolding of integral and likeminded approaches is the object of another line of research I am pursuing and preparing to publish.

²⁷ Like meta-(theoretical, methodological, ...) studies and (neo-)humanist, critical realist, transformative, transdisciplinary, transmodern, biosemiotic, multifocal, complexity and quantum paradigms, among others.

Instead, developing various forms of *integral pluralism* (Dallmayr, 2010; Gidley; forthcoming, 2007; Molz & Edwards, 2010) allows basic commonalities and relationships among the multiplicity of perspectives and traditions to become more apparent, more approachable and more useful, without neglecting their differences and specifics. The challenge, hence, is to bring responsibly together the wealth of knowledge, and of quality criteria and methodologies scientific research and higher education have brought about so far, but also the practices and results of other viable paths of development of knowledge and wisdom, practical and spiritual. Contemporary ILAs are precisely designed as possible answers to this huge challenge, and they overlap in their concerns and contentions whether or not their proponents are aware of this or not.

The development and cultivation of integral knowledge, however, is but one strand of the endeavour of ILAs. Overall, it strives to value, deploy and sustain a *wisdom* adapted to our era (Awbrey & D. K. Scott, n.d.; Blasi, 2006; Maxwell, 2007; Standish, 2000). This can happen through a mindful reintegration of the (necessary and welcomed) modern differentiation between sciences, arts and spiritualities as the three major interdependent realms of human beings' expression and (co-)construction of reality. ILAs transcend the widespread representation of science as value-free and of spirituality as renouncing this-worldly affairs, as well as the idea that the practices of the arts and the sciences, the sciences and the spiritualities are necessarily at odds with each other. They are designed to develop interwoven integral sciences, integral arts, integral ethics, and integral spirituality and to raise the awareness for their multiple interrelationships.²⁸ Based on a widely shared emergent complexification principle of "differentiation without separation" (rather than reductionist simplification through "differentiation and separation") most promoters of ILAs are hoping to contribute to overcome the pervasive split restated in much of Western thought between subjectivity and objectivity, values and facts, theory and practice, being and becoming etc.

As much as many efforts have been put into developing more encompassing conceptual frameworks corresponding emancipatory practices are called for. Those practices invite individuals and collectives to realise their specific potential through synergetic self-transformation of body, mind and spirit, mindful communication, social service and communities of inquiry, and finally through transformative action related to the political, economic and environmental systems. There is a huge array of practices which can be composed into an integral lifestyle. This allows to follow personal preferences, habits, vocation, bliss or cultural traditions and nevertheless to live up to a shared integral ethos. On this basis it becomes possible to locally and globally inter-relate to each other and integrally co-evolve together. The overall goal of emancipatory practices is to consciously contribute to the health of the whole multi-layered individual and collective adventure of evolution instead of supporting one part or level while neglecting or being harmful to others (and by this retro-actively to oneself, immediately and in the long run). ILAs directed to small and large scale individual and institutional transformation emerge as a necessary wing of such a commitment for an undivided, interconnected and creative life. Higher education, then, cannot be an exception. Rather, it

²⁸ See e.g. the role of aesthetics in the process of scientific discovery, the technologies of artistic production, the value orientations implicitly or explicitly guiding scientific research.

should be a priority given its purportedly central role in the upcoming global, networked, knowledge-based society.

However, those ILA-streams that are already engaged with questioning, infiltrating and transforming higher education are often so self-absorbed by their own intellectual and organisational development, frequently at the limit of sheer material survival, that apparently there are no (motivational, mental, time and organisational) resources left to imagine and realize overarching coordination and synergy, across streams and initiatives. Another unsolved challenge is adding to this problem: how to assure that the work of one generation (e.g. the work of the founder of a stream) is carried on by the next generation? Generally, inside academia, immediate intergenerational lineages as they are common in and constitutive for disciplinary research do not exist for ILAs. Some of the reasons for this are the lack of institutional containers: there are (almost) no ILA-institutes, study programs, degrees and labor markets. The stream-specificity of labels, networks, associations, conferences and journals prevent a common identity and intellectual space to coalesce, to be institutionalised and promoted more visibly. On this basis ILAs cannot contribute their crucial potential of complementing specialized research and stimulating new, less fragmented practices. Institutional achievements of one generation of scholars at one place tend to disappear, forcing the next wave of pioneers to invest large parts of their energy to start organising everything from scratch. The number of pioneers who see their vocation in breaching the fortresses of mainstream academia at the considerable risk of getting threatened and lost themselves, together with their families, is limited, however. The number of persons interested in ILAs, and ILA-based higher education is much larger, and it is certainly growing from age cohort to age cohort. Accordingly, more thoroughly conceived strategies for institutionalising ILAs in higher education and research are an absolute requirement as today the critical mass of scholars and (future) students inspired by ILAs already exists whereas a sufficient number of adequate institutional contexts do not yet exist.

Conclusion

The historical differentiation of the scientific knowledge sphere from other societal domains (especially religion), and in itself, has turned in parts into dissociations that have become a road block to further evolutions in higher education, research and society. As long as analysis is structurally highly favoured over synthesis, and diving into ever smaller details more valued than the way they connect to each other, there is really a huge problem. Regardless, growing implicit and explicit demand and the urgent need for a more boundary-crossing and integrated research, education and societal problem-solving of those approaches responding to these demands, like ILAs, are largely ignored or even actively rejected by the academic world as it stands. On the other hand, inter- and transdisciplinary inquiries are today still very often plagued by a lack of conceptual and methodological grounding and they are often too loosely coupled with more specialised discourses to have a positive career impact. The deep-rooted institutional fragmentation of knowledge and knowledge production (as reflected in organisational structures, job descriptions, study and funding programs...) works like an in-built immune-defence against attempts to learn about, develop further and make use of ILAs. At the same time the worldview revolutions that have occurred in the 20th century through scientific research itself are pretty much conducive to ILAs if they were taken more seriously by mainstream researchers and decision makers in higher education.

These are reasons why the existing explicit or implicit demand arising from “unsolvable problems” in society on the one hand, and from spreading post-materialists values in the population on the other hand, is not satisfied by the academic world as it stands now, nor, by the way, by adult education providers lacking a research basis and charging high fees for their services. There are more and more initiatives inspired by ILAs popping up today but quite often they are ignoring each other, especially across national, linguistic, disciplinary and stream boundaries. Under these conditions, for reasons inherent in mainstream research and higher education as much as reasons inherent in the current (academic) practice of ILAs themselves, there is still much work to be done towards an acceptable and accepted integral pluralism which could provide a conceptual basis and viable praxis for setting up HESPs inspired by ILAs. It appears that this development could be catalyzed by more and better cooperation across streams of ILA in conjunction with more thoroughly conceived strategies for institutionalising ILAs in higher education and research.

European Higher Education Area

A Europe of Knowledge is now widely recognised as an irreplaceable factor for social and human growth..., capable of giving its citizens the necessary competences to face the challenges of the new millennium ... (Bologna Declaration, 1999)²⁹

In Europe, many universities emancipated from clerical authorities during the Renaissance. An individualistic humanism gained importance at that time and became a structural feature of higher education. As Latin served as lingua franca mobility of academic teachers and students across universities and countries was relatively widespread and allowed new ideas to spread with relative ease. But when universities became more and more involved in and instrumentalised for building the modern nation-states, teaching was switched to the respective national language, and new subject matters besides the classical canon were introduced. Like the nation-state, the European type of university became implemented worldwide, very much by i) 16th-19th century colonialist expansion and its neo-colonial aftermath until today, ii) the attraction of the apparent successes of technology based on discoveries in the sciences which provided an “international” language for researchers and engineers regardless their origin, and finally iii) developmentalism as an extremely pervasive political ideology of the second half of the 20th century hypnotising the global South to catch up with the North Atlantic nations in terms of the latter.

Even though the university came to the West in the 11th/12th century probably borrowing from prior Arabic models and earlier ecclesiastical schools, the foundation of new HEIs spread quite slowly across the entire European peninsula. It took centuries to fairly cover the European territory and only concerned the elites. The substantial expansion of the higher education sector is pretty much a recent phenomenon. The large majority of contemporary European HEIs have been founded in the 20th century. In addition, after the 1968 “revolution” the higher education sector expanded considerably and student intake rose dramatically resulting in the first wave of massification of higher education. To date, in the EHEA there are around 4000 HEIs in which

²⁹ <http://ec.europa.eu/education/policies/educ/bologna/bologna.pdf>

roughly 20 million students are enrolled.³⁰ Despite the demographic shift in Europe a general decline of the absolute numbers of higher education attendance is not forecasted in the immediate future because i) the attendance rate per age cohort is still rising, ii) more international students are attracted to the EHEA, and iii) lifelong learning becomes more and more a policy and a career requirement, i.e. the number of non-traditional students is rising as well.

Given its history Higher Education in Europe is very much a public and state-funded affair, and compared to the USA today there are pretty few private universities. Until recently attending a higher education program at a public higher education institution was basically free and not fee-based in most continental countries.³¹ Even though this is about to change in several countries the fees introduced are generally considerably lower than in the Anglosaxon countries, and any introduction of fees is heavily contested and subject to intense political struggles, and there are first cases of already implemented fees being cancelled again by a new government. So, as higher education in Europe is now undergoing the ultimate wave of “massification” and as additional public resources won’t be made available in many countries for a long time to come,³² there is a desperate search for additional resources from third parties. At the same time there isn’t any widespread culture of private donations to higher education. It goes without saying that the current global financial and economic crisis whose effects will only really hit higher education from 2010 onwards, doesn’t make a situation better which has already been structurally bad in most places for a great many years. This has often started to affect the quality of academic learning, e.g. because of a worsening ratio of students per teacher. This state of affairs often prevents deep-level innovation spreading across isolated test areas and favours a “back-to-the-basics” mentality, i.e. back to the traditional disciplines. Innovation, however, generally comes from the margins of the disciplinary mainstreams, from the interfaces between up-to-then isolated strands of inquiry, and from outside or the fringe of the academic system. There is little institutional action, however, that would actually flow from this recurrent insight from research on innovation.

These evolutions are the background for and mingle with the so-called Bologna process.³³ The Bologna process is a large-scale, transnational reform of the European higher education systems, actually the largest undertaking of targeted transformation of higher education the

³⁰ Let’s assume that 0.1% of these students are more actively and consciously favouring a clearly ILA-based higher education over (post)modern study programs. This is an extremely pessimistic estimation largely underscoring the actual results of the empirical values studies available to date. In this case an educational provision corresponding to these expectations could mobilize 20,000 students in Europe. Taking into account their diverse interests regarding content and focus, and imperfect communication and matching opportunities, it still holds true that a provision that could attract thousands of students with already existing and conscious ILA-affinity simply isn’t there yet. Even less explored are the opportunities to attract the even more important number of students with a latent affinity.

³¹ The case of the UK being more aligned with other Anglosaxon countries worldwide.

³² There are interesting exceptions to this general rule in rich countries like Norway strategically investing its gains from its national oil industry into education, or Luxembourg trying to perform a late but quick move into the knowledge age by investing into the creation of a national research and higher education system.

³³ <http://www.ond.vlaanderen.be/hogeronderwijs/bologna/about/>

world has ever seen. It was started in 1999 – symbolically at the oldest university of the Western world³⁴ – by the ministers in charge of higher education of several European countries. To the surprise of many sceptics and of observers of past failed attempts to harmonize the pretty strong and diverse national traditions of higher education in Europe, reaching deep into the history of the creation of nation-states, this reform gained considerable momentum. Eventually it attracted 46 European countries, from Ireland to Russia and from Norway to Cyprus, to engage simultaneously in one of the most far-reaching transformations their national higher education systems have undergone since their creation. The shared overall goal of this reform is to create a common European Higher Education Area (EHEA). The process is widely supported, e.g. by supranational bodies like the European Commission, the Council of Europe, and the UNESCO European Centre for Higher Education, but as well by international associations like the European University Association, the European Students Union and the European Association for Quality Assurance in Higher Education. Nevertheless many critics have shown up and many attempts to undermine or at least limit or delay the process have occurred in various countries and disciplines (basically pleading for variants of “new wine in old wineskins” or even “old wine in old wineskins”). But in the end the proponents of this version of a TINA (“there is no alternative”) formation³⁵ won the battle and the Bologna process will be generalized until 2010 with only very few exceptions to its general scheme.

The major goal of the reform is the full mutual recognition of higher education degrees based on a three cycle system (bachelor, master and doctorate). This becomes possible through the generalisation of the European Credit Transfer System (ECTS) which is presupposing a complete modularisation of all study programs. The specific trajectory of each student is reflected in a mandatory and standardised diploma supplement based on the new European qualifications framework and their national specifications. The content and output (in terms of competencies) of each module needs from now on be described for study programs to become accredited. In some countries this does not change that much, in others this induces a radical transformation from input to output orientation, from content to competencies. Other goals of the Bologna process are the coordination of the quality management systems, the strategic facilitation of transnational mobility of students, graduates, faculty and staff, greater relevance of higher education and research for society and a better integration of higher education in a process of lifelong learning (Garrod & MacFarlane, 2007).

Even though the EHEA will be officially inaugurated in 2010 as planned at the beginning of the Bologna process certain “collateral damages” of this unprecedented multi-stakeholder effort are emphasized by the critics, among them:

- The problem that national systems based on different types of HEIs (e.g. universities and polytechnics-like HEIs) are unlikely to survive in the long run because of the formal equality of their degrees the reform has enforced, and so a unified system will become pervasive and with it the rush for ranking between individual HEIs – if this becomes true the idea of harmonization based on diversity and cooperation turns into homogenization destroying diversity and favouring strongly competitive institutional behaviours.

³⁴ The University of Bologna is believed to be founded in 1088.

³⁵ See footnote 16.

- The fact that today there is not much less cross-country, cross-domain and inter-institutional structural diversity of programs than before and that the transnational readability of degrees is only apparent³⁶ whereas internationally well-known national diplomas were forced to disappear.
- Academic freedom and possibilities for transnational mobility for students have actually been reduced rather than enhanced, at least on the Bachelor level because those first-cycle programs have often become much more school-like than the first years of the former study programs were before in several countries, with a tight, fixed and prescribed curriculum and ongoing assessment without, however, reducing the drop-out rate which was one the driving goals for this transformation. In addition, many intra-European cross-border programs which were running well before the onset of the Bologna process didn't survive the implementation of the new constraints related to it.
- In many countries in which the doctoral level research training has not been formalized before it now becomes formalized and thus limits self-governed unfolding of personalized trajectories of research and building of unique profiles.
- The requirement to split and package the entire learning process of all students into predefined little modules which can be often quite randomly combined is much more favouring a spirit of tactically collecting credits from modules allowing to acquire them with the least effort than to engage in more organic and sustainable processes of learning related to the potential of a student.
- The specification of learning outcomes and ECTS points for each module is more often than not an artistic and rhetoric exercise rather than an approach grounded in method and data. The ECTS points are calculated on the basis of an (often simply invented or roughly estimated) average workload for a fictive average student. The extent to which the assessment of the competencies acquired through a module is connected to the competencies specified in the module description is often pretty much unclear. This approach anchored in the old-fashioned and fragmented thinking in time-slots and in the separation of curriculum planning, learning and assessment activities rather than in integrated processes of learning fosters normativity rather than individual pathways, in contradiction to the strong European diversity-policies.

If some of these critiques turn out to be or become at least partly true then in some respects the Bologna process put into practice worked paradoxically against its own well-intentioned goals. This effect is not different from many institutional reforms conceived and implemented with little involvement of those being concerned in the first place (somehow the “new wine doesn't fit into the new wineskins”).

With regard to the second cycle (Masters programs) a twofold development can be observed so far, a development I would like to emphasize for the sake of the argument in the strategy section: On the one hand there is a tendency to just rename pre-existing programs and to try to

³⁶ There are now Bachelor programs of 3 and of 4 years full time duration, and Masters programs of 1 or 2 years duration, and all combinations thereof. Accordingly, a Masters degree made in Europe can now reflect between 4 and 6 years of actual study. As a consequence, a much deeper understanding of individual trajectories is now required.

continue business as usual (basically “old wine in new wineskins” – whereas the old wine risks to turn into vinegar through its rebottling); on the other hand in many countries with a traditional single long-cycle system now all of a sudden the first cycle and the second cycle have become structurally delinked. This has triggered a wave of creativity to develop completely new, and at least partly innovative programs in order to be attractive for students from a broader range of first cycle programs and as well for non-traditional students (professionals, part-time students etc.). Many of these truly new programs (“new wine in new wineskins”) open up specific interdisciplinary niches, have an international outlook,³⁷ and are run by an inter-institutional and cross-border consortium rather than by a single HEI (see sections on strategy and contours). The “Erasmus Mundus”³⁸ support program of the European commission, started in 2004 to complement the long-standing Erasmus program for individual intra-European student mobility, has made this development even more prominent. Through a very competitive process Erasmus Mundus selects high quality cross-border European Masters programs and endows them with attractive scholarships for non-European students (!)

Another recent major transformation of academia has to be noted: many HEIs in many countries have switched from a traditional self-governance model of the professoriate to new governance styles adopted for their management. To make universities more agile small university councils have taken over the power to decide on major strategic issues. They are generally composed by a small number of personalities from different walks of life external to the HEI. This transformation was catalyzed by the new public management approach releasing decision power to educational institutions which were under direct state control before. If it is true that this managerial approach has been speeding up reform processes in many cases in which they were blocked for decades by a traditionalist professoriate, it has further reduced the already few possibilities of participatory decision-making, and of electing representatives bottom-up. In HEIs that have adopted the model of external university council the split between research and higher education managers on the one hand and scholars, young scholars, and students on the other, has become even more profound than it already was the case before. The development of such a HEI very much depends on the intellectual horizon and foresight of the members of the council, the time they actually invest in their deliberations, and the quality of dialogue and decision-making between them. It goes without saying, that in practice this varies considerably. Those councils can trigger and favour innovation as much as they can suffocate new bottom-up initiatives – in each case it really depends on just a couple of men (mostly).

If this means less democracy within HEI’s another trend democratizes access to higher education degrees. New national laws were introduced³⁹ that generalise and organise the possibility of formal recognition of learning that takes place outside HEI’s, in non-formal or occupational settings, for the acquisition of higher education degrees. Even though not directly linked to the creation of the EHEA these laws are very much affecting higher education. They considerably strengthen the value of practical experience and rebalance the relationship between practice-based learning and theoretical learning. The juries created to decide on requests of

³⁷ Some are run in English in countries where English is not the national language, or in more than one language, to be attractive to international students.

³⁸ http://eacea.ec.europa.eu/erasmus_mundus

³⁹ In more and more European countries – the UK and France having taken the lead.

academic recognition of practice-based learning are generally composed of scholars and practitioners. This creates a completely new contested field in which power games and hot debates are occurring, but as well mutual learning. Many practitioners are eager to get their actual competence formally recognized whereas the professoriate is still often reluctant to accept other paths of learning than the one inside the ivory tower, but is more and more legally forced to do so. The translation of practical experience into academic subject matters or study modules is far from self-evident. It is often quite demanding for the candidate to submit an application that is bridging the two worlds convincingly. But more and more succeed, and so a new era has started in which the boundaries between the worlds of theory and practice are becoming more permeable.

Astonishingly loosely coupled with the EHEA is the development of the European Research Area (ERA). Transnational research and development partnerships are very much triggered by the European framework funding programs in many different focus areas. Traditionally, mixed-type and cross-sector partnerships are particularly welcome. The programs have been considerably redesigned on the basis of a quite innovative at least partly open, participatory process and an independent European Research Council has been created from scratch. The new funding schemes resulting from it have been implemented with the 7th Framework program.⁴⁰ The European Science Foundation offers additional interesting opportunities.⁴¹ An unprecedented emphasis on boundary-crossing approaches can be noted.⁴² On the other hand, it still holds true that the administrative load is important in EU projects and that it remains very difficult to acquire European research money for process-oriented research as task and outcome has to be fixed and detailed in advance. More and more applications are submitted which makes the competition quite fierce. But nevertheless it appears that sometimes ILA-informed approaches can manage to correspond well to the European research policy whereas this is often more challenging on the national level.

⁴⁰ <http://cordis.europa.eu/fp7>

⁴¹ <http://www.esf.org>

⁴² In a Communication of the European Commission called “Delivering on the modernisation agenda for universities” (2006) one of the required lines of action is called “Enhance interdisciplinarity and transdisciplinarity” and spelled out as follows:

Universities should be able to reconfigure their teaching and research agendas to seize the opportunities offered by new developments in existing fields and by new emerging lines of scientific inquiry. This requires focusing less on scientific disciplines and more on research domains ... associating them more closely with related or complementary fields (including humanities, social sciences, entrepreneurial and management skills) and fostering interaction between students, researchers and research teams through greater mobility between disciplines, sectors and research settings. All this necessitates new institutional and organisational approaches to staff management, evaluation and funding criteria, teaching and curricula and, above all, to research and research training. The implications of inter- and trans-disciplinarity need to be acknowledged and taken on board not only by universities and Member States, but also by professional bodies and funding councils, which still rely mostly on traditional, single-discipline evaluations, structures and funding mechanisms.

(http://ec.europa.eu/education/policies/2010/doc/comuniv2006_en.pdf)

Overall, the broadly pushed structural development of the EHEA and the European Research Area is currently going on, and will go on beyond 2010, together with waves of reforms and pseudo-reforms on the national level. On this basis, there are different trends to be observed, among them:

- Accountability towards society is going to become more important and more immediate for higher education and research institutions than before. The new governance models bring external quality assessment systems to countries and institutions in which they have not been in use so far.
- Modularisation has quickly become not only the main buzzword but a must for the organisation of any study program to become accredited. The learning outcome / competence / ECTS-slang and the according rules of the game need to be mastered.
- Hyper-specialisation in research and education is continuing but transdisciplinary approaches are getting more opportunities to actualise than before.
- Internationalisation starts only now to become really important for many HEIs. It is evolving from a nice-to-have add-on concerning a minority of incoming and outgoing students to a strategic core concern for the future institutional development.
- Lifelong learning has become a prime directive and the market for higher learning especially in postgraduate and continuing professional education is indeed ever growing.⁴³
- Underfunding and restricted, structurally overregulated career paths are currently generating "HEIs short of academic teachers and researchers" (the average student / teacher ratio has been substantially growing in most European countries over the last decades) and "academic teachers and researchers short of HEIs" (there are many highly qualified researchers and academic teachers not fitting to the profiles of the job openings and the bureaucratic regulations regarding staff categories).
- Student-centred learning has very much become a trend designating most varied actual practices of teaching and learning, many of which are student-centred to a very limited degree only (see section on contours).

Conclusion

The Bologna process is such a huge undertaking, so unfinished yet and requiring reforms of the reform, that a next wave of reform of the whole higher education system in Europe, a reform of a more integral kind, is very likely to take generations to shape up. So, basically, for decades to come and despite extremely pressing societal challenges, we cannot realistically expect a methodologically more integral reform of the higher education system specifically devised to transform the structurally integrated EHEA into a substantially integral EHEA. The EHEA as conceived by the promoters of the Bologna process is a reality from now on which can neither be ignored nor circumvented. Accordingly, a thorough analysis of its problematic aspects needs to be followed by a focus on the opportunities it offers. These opportunities are mainly i) a more and more favourable climate for boundary-crossing approaches on the level of European and other funding programs, ii) the need to attract new student populations in a situation of stronger

⁴³ However: "lifelong learning tends to contribute to the fragmentation of knowledge, while at the same time enhancing the appropriation of knowledge by individual learners" (Kehm, 2001, p. 5).

international and inter-institutional competition, declining resources and demographically diminishing young generations combined with the receptiveness of certain target groups for new programs corresponding to their values, expectations and lifestyles, iii) new spaces for creativity that can be deployed for developing and implementing new Masters programs and doctoral schools, especially by innovative inter-institutional consortia. The precondition to succeed under the conditions reigning now is to understand and master the new formal and terminological game that everybody is required to play.

Strategies

What the future of the university will be, as with all questions about the future, is unknown. Our intent is to ... contour the unknowable ... While historical forces will dramatically change the current university there are still choices to be made as to the shape of future universities. (Inayatullah & Gidley, 2000, p. 13)

This section is devoted to a strategic reflection of various options and paths to developing higher education generally, and more integral variants of higher education more specifically. It appeared to me that such a strategic reflection has not yet been conducted, that the array of options is rarely fully explored, and that past failures to advance more integral forms of higher education in Europe and elsewhere may in part be related to weak, implicit, undiscussed strategies. On this basis a promising strategic corridor will be proposed within which the likelihood to advance ILAs in the EHEA and to advance the EHEA with ILAs is higher than with other strategies.

Strategic Options for Developing Higher Education

I will now first turn the attention to strategic options available to HEI's within the EHEA (and beyond), then to options available to programs, and then to options available on the course-level. On all these levels I will discuss the options most of the time chosen and reproduced by past attempts to implement more integral alternatives and complements to mainstream higher education.

For higher learning in Europe there seem to be three major institutional options:

- By far the most dominant one is the rat race within under-funded public universities and their more or less traditional faculties, disciplines and sub-disciplines;
- Second are the often domain-, purpose-, or stream-specific private or corporate "universities;"
- Finally, there are new (cross-border) virtual providers (often lacking a research-base on their own), or more traditional open universities, and their often ready-made programs.

We have to be clear, that the main structures, goals, practices and respective funding and incentive systems of none of these types of HEIs is primarily concerned with, prioritizing or structurally supportive of ILAs. Of course there are niches and margins that are potentially more conducive – we will come back to them later (see section on contours). Today, regardless the structural, strategic and other differences between institutional types, they are equally focused on

assuring funding (or making money) and creating reputation (in terms of rankings, external quality assurance reports etc.). In a way, all those institutional options are likewise structurally limiting rather than enhancing innovation and transformation as perceived as necessary from the angle of ILAs. None of them fits well to the idea of a more integral higher education which is neither disciplinary nor necessarily limited to one specific practical domain nor easily transmitted as content packages dissociated from actual research and authentic face-to-face encounters.

There are probably more failures than thriving attempts in Europe to implement sustainable alternative and vanguard models for entire higher education institutions. As a matter of fact, despite a comparable size of their higher education systems (see section on contours) there is a considerable less important number of such institutions in Europe compared to the USA.⁴⁴ Many of them are financially unstable, of mixed reputation and durably marginal to the overall system. Over time, they tend to disappear, stop to further evolve after the initial impulse or to become re-mainstreamed. Even though pressures having these effects are by no means unique to the specificities of European higher education they seem to have a strong(er) impact there. Nevertheless, there are still new attempts under way to create alternative higher education institutions and of course we can only hope that some of them will be luckier than many of their “predecessors” have been.

Generally, the possibility to bring ILAs to higher education by building new, alternative, private HEIs from scratch is severely limited in Europe, even though this is precisely the dream of many academic teachers and students inspired by ILAs, or simply by those discontent with the current state of affairs, especially as they have normatively shaped higher education everyday reality through the implementation of the Bologna process. Only in case of really important donations from several donors directed to one specific project over a consequent period of time it could be hoped to create a cross-domain “integral university” in the brick & mortar sense anytime soon. Even though legal barriers and regulations for the creation of private universities have been alleviated in some European countries I already mentioned that a culture of private funding of higher education is not well developed. Another important barrier is that fees cannot be very high for all but the most elite programs and will never be sufficient to run an alternative HEI without other sources of funding. Public funds go prioritarily to the already underfunded public HEIs and the new, fashionable “centres of excellence” (creating new opportunities in a few places and even more underfunding in all others). Conceiving and realizing alternative brick

⁴⁴ All over Europe there seem to be little comparable institutions to long-standing private alternative HEIs in the USA like the California Institute of Integral Studies, Naropa University, The Fetzer Institute, The Graduate Institute, Saybrook Graduate School and Research Center, JFK University, San Diego University for Integrative Studies, etc. The European examples like Schumacher College (GB), University for Humanistics (Netherlands), and the Campus University of Applied Integral Pedagogy, Health and Management which is in the process of being founded (Germany) are much smaller, less developed and more strongly focused initiatives, among other upcoming projects. The University of Witten-Herdecke (Germany) can be considered a major attempt to build a private vanguard model of a multi- and cross-disciplinary university. It has gone through a series of serious crises and backlashes until recently, though, so that it remains to be seen which parts of the original vision will survive in the long run.

& mortar dreams absorb an amazing amount of time, energy and resources. If by good luck such an institution appears and remains on stage it can serve a specific function in a broader view on how to evolve toward programs of integral higher education (see section on integral organizations).⁴⁵

The institutional level having been discussed, let's now turn to the options on the program-level because they are more lightweight and easier to realise, at least some of them. On this middle-level, basically there are three largely dominant options once again:

- The *traditional strategy* to have disciplinary programs starting in the first cycle and then continuing through the second to the third cycle. This is not only the chronological order students are running through the programs but as well the traditional way to set up new programs – like the stories of a building from the fundamentals to the roof. As such continuous programs in traditional disciplines are run in many universities they attract and first and foremost students who are geographically close-by already before their enrolment.
- The *umbrella strategy* of generic programs allowing for specialisation after having taken some introductory courses of general interest. This strategy is more and more employed because the administration and promotion of many small programs is more complicated and expensive for a HEI than the administration of larger generic programs. This fits well with the general tendency to look for economies of scale but it creates at the same time additional need of student support and guidance to help them find their specific way through such a broader offer. Therefore, often, choice is relatively restricted to quite a few predefined options whereas principally more choice could be offered on the basis of this option than on the basis of the other two options.
- The *niche strategy* of small programs specialized as a whole from the outset (either in the sub-disciplinary or in the interdisciplinary sense) and attracting students partly coming from far away precisely because of the unique or rare speciality. The niche strategy is most promising for smaller departments or upcoming HEIs but often requires considerable efforts in marketing to become known and to continuously attract a sufficient number of students. It applies rather to the second and third cycle than to the first cycle.

Regarding the perspective of the development of HESPs inspired by ILAs, none of these three options really fits. Integral studies won't evolve into a discipline anytime soon, and for many ILA-inspired researchers it would be a pretty self-refuting prospect to create a new discipline alongside the traditional disciplines. Can we seriously expect integral studies to fare better than philosophy which has degenerated from the “mother of all disciplines,” the meta-discipline par excellence, the purported reflective centre of knowledge building, to an ungrateful niche

⁴⁵ A potential fourth institutional option will not be discussed here because it is extremely unlikely to occur: the transformation of an already well-established (post)modern HEI into an ILA-based HEI. In Europe, there is probably no single example for such a sensational transition. In the USA one example of an attempt in such a direction was the transformational leadership of David Scott as Chancellor of the University of Massachusetts at Amherst (see footnote 3), and the creation of the Community for Integrative Learning and Action (CILA) in which faculty from the HEIs of the Five Colleges Area connected for collective activities of learning and transformation.

existence within shrinking humanities departments, scattered into its own manifold sub-disciplines? No, we can't. Under the conditions of institutional structures tuned to support hyper-specialisation we can only expect that integral studies would have an even worse position.

The umbrella option must be ruled out as the critical mass of ILA-inspired researchers and teachers isn't there in any given single HEI in Europe,⁴⁶ and there is no department with the strategy to systematically attract this rare breed of scholars to it. It is extremely unlikely that anybody manages to start an ILA-inspired study program as a broad first-cycle program and attracts a sufficient number of students from scratch to make such an effort viable. As long as the umbrella strategy is realized mainly for administrative reasons and economies-of-scale inside one larger mainstream HEI it is not likely that a whole department is willing to get rid of an existing generic program and to replace it by an ILA-based one, or to subsume a variety of more specific programs under one single, integral umbrella. This may at best happen in a non-mainstream HEI, but we already mentioned the challenges and limits linked to such a whole institution strategy, especially in Europe. Even though the umbrella strategy would make the best fit for ILAs out of the three traditional program-level options it is unfortunately the least likely to be realized.

No wonder then that the niche strategy is the only one which has actually been tried out, as far as my knowledge goes, because it allows starting small and at the margins. The recurrent downsides are weakness within the hosting institution, insufficient numbers of employed faculty, and a less than optimal differentiation of tasks / responsibilities producing a lack of professionalism in certain areas crucial for the proper development of a new program, be it administrative support, public relations, teaching, research or quality development. The niche strategy has further downsides for ILAs. Not only because of the internal paradox to deploy an encompassing approach within a niche and the consequence not to engage and challenge the mainstream. But as well because of an external threat: This strategy lets ILAs appear unimportant amongst the large, traditional disciplinary programs who can afford to follow the umbrella strategy. Reversing the actual relevance of ILAs in a fragmented world the niche strategy creates an image which is very much conducive to get rid of such a program in case of cuts in funding or in case of its founder and director leaving the university, or other fragile transition phases. Commonly, niche programs are naturally considered to be non essential, a nice add-on, but not very important for the future of the HEI hosting it. And so it goes in practice: if there is no institutional strategy to develop the niche to become part of the core mission of the respective HEI – and this is not widely the case – then alternative niche programs only survive by chance in otherwise mainstream settings, and are easily wiped out, merged or re-mainstreamed.

Well, then the analysis of the program-level options doesn't allow us to draw a friendlier picture for the implementation of HESPs inspired by ILAs than the analysis of the institutional options. Nevertheless, the best guess is that in the long run there will be more HESPs inspired by ILAs at traditional HEIs than at HEIs created for the very purpose to develop such programs. The reason is a simple, numeric one: in Europe there are so many conventional HEIs around and

⁴⁶ This is different in the particular micro-climate of some of the alternative HEIs in the USA mentioned in the prior footnote.

so few alternative ones that a few attempts deployed at existing HEIs can easily outweigh the number of programs on offer at alternative HEIs. I will later return to the idea that both approaches shouldn't be seen in opposition but should ideally be linked to each other to the advantage of both sides and of the greater good.

This prediction that in the long run the strategic potential of conventional HEIs in the EHEA for developing ILA-inspired higher education is more important than the strategic potential of alternative HEIs can be related to an analysis of the course level options. I already mentioned the relative autonomy of the academic teacher in many if not most HESPs at many if not most traditional HEIs, even when declining here and there. As a space opened by this traditional core concern of academic freedom it is basically possible to introduce integral spirit, content, and andragogical approach (see section on integral andragogies) into the courses under any academic teacher's responsibility. This can often be done without too many problems as long as traditional academic values are respected (like critical rationality of discourse, theoretical pluralism, utilisation of explicit methods, recognition of existing research in the field, prevention of plagiarism etc.), and as long as the specialness of ILAs is not too much stressed and overtly displayed (e.g. in the title of a course).

As there are many academic teachers (and students) already inspired by one or the other variant of an ILA, there are many more courses already infused by them than are overtly declared. Either an ILA inspires the content, or the andragogical approach, or both. But despite certain dangers there are even already quite a number of courses overtly displaying that they are ILA-based. More often than not, however, they are a kind of outlier within a HESP not designed on the basis of integral principles and not directed towards integral purposes nor reflecting integral content all over. ILA-based courses might formally belong to a program but not resonate with it regarding the pursued approach. This being said, we have to consider a matrix of at least – $2 \times 2 \times 2$ – eight cases on the course level: i) ILA-based content – ILA-based andragogy, ii) covert or overt ILA-inspiration, and iii) courses resonating or not with other courses within a study program and the general approach of the overall program. This last option of several courses resonating with each other within a program comes already close to a program-level realisation.

As a consequence, the major problem so far is not that ILA-based courses are lacking altogether, but that they are isolated from each other. This isolation stems from the fact that in any discipline in any European country there are at best only a handful of academic teachers and researchers already adopting an ILA in their research and teaching, and that there are very few to adopt several ILAs at the same time, and/or deliberately working across and beyond the disciplinary lines. Accordingly, it is an extremely rare coincidence to have more than one person of this kind in the same department at the same HEI. And even two do not make up the critical mass to build an entire HESP on the basis of their respective courses, even more so as the game to gain institutional support and accreditation is far from assured in advance when it comes to unconventional orientations. Generally, those already teaching courses based on an ILA are inspired by different lead authors, teaching at different levels, in different study programs, in different disciplines, in different languages in different HEIs, in different countries. On the basis of so many heavily institutionalised boundaries, it appears virtually impossible to come to know each other by more than mere chance. Acquaintances are more likely inside the same country, the same discipline, the same ILA-stream. This is not a guarantee either. The specific situation of

ILA-inspired researchers within mainstream HEIs made many of them being used to being solitary and autonomous. As many are innovators in their specific contexts they are generally overwhelmed by more pressing tasks than looking for far away company. On this background, almost every academic teacher working on the basis of an ILA conceives, or is forced to conceive, his or her courses as self-contained units and not as being part of a cross-domain, international, integral HESP.

Conclusion

The creation of a HEI inspired by ILAs – in the more traditional understanding of a HEI – doesn't appear to be the most promising and efficient strategy to move things forward toward integral higher education provisions given that the resources absorbed by building brick & mortar infrastructures are distracted from being used right away for developing, researching, teaching, learning, and otherwise disseminating ILAs and bringing them into practical fields. None of the widespread strategies to implement new study programs seem to be very adequate either for realizing HESPs inspired by ILAs. On the other hand, on the course level there are many scattered attempts to move toward designs, approaches and content inspired by ILAs. Accordingly, these readily available resources and capacities need to be disclosed to each other much more and combined and uplifted to the program level through strategies departing from those pervasively employed in conventional higher education (with success), and more or less copied by scholars and activists inspired by ILAs (without much success).

Strategic Corridor for Building Integral Higher Education

In complex situations, i.e. where in the same place and at the same time there is not only order but as well disorder, where there is not only determinism but as well chance, where uncertainty emerges, there is a need for the strategic attitude of a subject; in face of ignorance and confusion here perplexity and brightness are indispensable ... The method/path/attempt/crossing/research and strategy can't be reduced to a ready-made program, not more than to a statement of an individual experience; in fact, it is the possibility to find in the details of the concrete ... life, as fragmentary and dissolved it is in the world, the totality of its open and temporary sense. (Morin, Ciurana, & Motta, 2003, pp. 17, 24-25)⁴⁷

⁴⁷ Translation of the quote from the French original by the author of this essay. Edgar Morin was research director of a transdisciplinary research centre at the CNRS (French National Research Centre). He is a prolific writer across many fields, since 1946, and has received numerous awards and honorary doctorates worldwide. The core of his approach to complex thinking is laid down in the six volumes of *La méthode* (Morin, 2008). He wrote a commissioned report on the future of education for the French government (Morin, 1999a) – which evidently was not followed, and another one for the UNESCO (Morin, 1999b). He is co-initiator of the International Observatory of University Reforms: www.orus-int.org and of the Collegium International on Ethics, Science and Governance: <http://www.collegium-international.net>. A University built on his educational recommendations has recently been created in Mexico: www.multiversidadreal.org. Edgar Morin is insisting on the fact that the necessary reform of thought under conditions of complexity and the necessary reform of higher education are co-conditioning and co-determining each other, and that one side doesn't move forward without the other.

Based on the array of options discussed in the prior section and their respective advantages and disadvantages, a strategic corridor for the implementation of more integral versions of higher education is becoming apparent. The strategic corridor is a selection of options and a more circumscribed array of paths of developmental progression which is more likely to succeed than paths following options outside this corridor. This doesn't imply that under particularly favourable conditions other options and paths couldn't succeed. It just supposes that this is more difficult and less likely. It appears that conventional ways of conceiving higher education in terms of brick & mortar institutions, in terms of disciplinary or interdisciplinary programs run by one such institution, in terms of study programs composed by courses taught by scholars who are employed by the respective institution, are not very helpful and conducive for the implementation of (more) HESPs inspired by ILAs. Accordingly, academic teachers and researchers interested in conceiving and actually implementing these kinds of new programs need to transcend such a conventional understanding of higher education, at least if they are not by great chance supported by an unconventional local context allowing to conventionally implement unconventional HESPs.

The development of a more powerful strategy can be based on at least two sources of insight. First, on a reflection of failed attempts to implement a more integral higher education provision.⁴⁸ As far as I know, there has not been any cross-case analysis of such failed attempts yet. Second, on a reflection of the characteristics of higher education systems and their major historical transformations over a long period of time (in the perspective of the last millennium, see appendix). For any integral approach to transformation of higher education in this century a proper understanding of its (Western)⁴⁹ long-term history is crucial. Such an understanding is necessary for selecting and integrating constructive features from all periods, medieval, modern and postmodern, and to transcend those features that fit less and less well in our time given the evolution of culture, social structure, educational provision and technology, and given the unprecedented characteristics of the challenging contemporary macro-shift.

Let's start with listing some major problems which I could repeatedly observe in past attempts to implement HEIs or HESPs on the basis of an inspiration at least close to ILAs:

- Investment of the limited material and intellectual resources available to ILA-inspired scholars and activists to establish a new HEI instead of investment directly in study and research programs (see this section);
- Too much idealism coupled with lack of viable strategies and professionalism regarding organisation and management (visionaries and vanguard researchers are not necessarily, or perhaps even rarely, good strategists, implementers, and managers committed to the required practical organisational work on a daily basis, see this section);

⁴⁸ The failed, disappeared and long-term marginal, unstable or weak attempts will not be mentioned explicitly in this essay in order not to blame those who tried hard to realize their projects and didn't reach their goals. The analysis, however, which was leading me to the suggestions and conclusions exposed in this essay have actually been conducted case by case.

⁴⁹ An extension of this analysis to the forms of higher education other historical civilizations have developed would fruitfully extend and deepen this reflection but cannot be performed in this essay.

- Lack of cooperation with enough suitably (i.e. traditionally) qualified academic staff to teach courses rooted in actual academic and professional expertise, and as a consequence avoidable problems with academic recognition of the initiative adding to the unavoidable ones arising frequently in the conventional, disciplinary, and sometimes openly hostile institutional environments (see this section and the one on contours);
- Reproduction of the individualistic bias inherent in higher education and Western culture regarding both, project development (involving often too much pride, idiosyncrasy and closure) and andragogical approach (often not differentiated from pedagogical models, see sections on integral learning communities and integral andragogies);
- Under-utilisation of the new opportunities afforded by the most advanced Web 2.0 information and communication technologies (learning management and virtual community systems; multimedia conferencing; intertwined personal, team and collective digital media repositories and portfolios etc., see section on integral organizations);
- Weak or entirely lacking international cooperation in terms of inter-institutional partnerships, transnational mobility, cultural diversity, multilingualism, global service learning etc. (see section on contours);
- Lack of institutional capacity to grant accredited, widely recognized degrees appealing to a range of potential employers (i.e. too much reliance on the intrinsic value of the offer and blindness regarding the links between the institutional fields of higher education and work, see section on integral organizations);
- Overestimation of the willingness of potential students to pay high tuition fees for unknown, beta-phase programs, in a European environment in which tuition-free programs still exist in various countries (resulting in insufficient student influx, see section on integral organizations).

The conventional structures of higher education won't fade away any time soon given that they have been quite stably reproduced for decades and in parts even for centuries. They have their use and value, even for future HESPs inspired by ILAs attempting not only to induce change regarding the content of higher education but also regarding the "containers" and finally those persons (re)producing the content and the containers. Of course then the question arises how to connect with and influence something as inert and traditional as higher education as a system? Well, by riding on it rather than attempting to supplant or change it directly. We are well advised not to expect a multi-centennial institution to change its core quickly – somehow like riding an old horse doesn't change its constitution and temper whereas the equestrian can and must nevertheless provide direction. It has even been considered one of the defining characteristic of HEIs to appear flexible at their margins in order to better protect and reproduce their core over many generations. If we consider the core of higher education to be a space for the rational pursuit of knowledge and the reflective development of creative and responsible inquiry not dominated by other societal domains like politics, religion and the economy, then, actually, it is not that bad that this cannot be changed easily. In this case we can be lucky that there is an immune system protecting academic freedom against ongoing assaults from many sides. If we consider the core of higher education as delivering degrees to those students most apt to follow through a ready-made disciplinary or pre-professional program and reproduce a fixed knowledge canon just-in-time on exams, then institutional inertia is indeed truly embarrassing in 2010.

I do not hold an idealistic vision of academic freedom in practice. Nevertheless, in great many cases, faculty has not only the possibility but the duty to pursue research and teaching according to what is deemed important and promising to them. There is an extremely individualistic bias to it reflecting a path Western cultures have had the tendency to go down more generally, a path still very much amplified by the specifics of the career ladder leading to professorships. Nowadays, this untouchable, individualistic academic freedom has suffered in many respects, especially through imposed frameworks for curricula like the modularization and learning outcomes hype, through formalized assessment, evaluation and accountability procedures, through more specific job descriptions, application guidelines and institutional development plans. But in the end, this might only appear as a new version of an old tension between the work of university administrators and the work of scholars. This tension is somehow part of the core of higher education as well. Putting aside its frequent Kafkaesque downsides and exaggerations, administrations of HEIs must be acknowledged to create relative stability and predictability and above all, they manage student enrolments, facilities and infrastructures, however they do this. All those who ever tried to build up their own infrastructure and administration know how much this diverts from the academic core business of research, teaching and service to society. So, basically, why not take advantage of the infrastructure (buildings, student administration, fundraising and degree granting reputation, access to physical and digital libraries, etc.) while not becoming sucked into its development and management?

The flexible margins sitting on this solid infrastructure concern the question what is researched and taught with whom to whom, when, where and why. As long as the basic interests of a HEI, or a department or institute are respected concerning student intake and success rates, academic reputation, acquisition of external funding, respect of equal application of formal rules regarding e.g. the teaching load etc., there is more than one possibility of running a program that can be (made) acceptable from an institutional and scientific perspective. The already mentioned trends toward more and stronger inter-institutional networks, toward strategic internationalisation, and toward pervasive utilisation of information and communication technologies are quite helpful. These trends are trickling into the core of HEIs – at least formally – and make the flexible margins of higher education even more flexible. On this basis the margins of and interfaces between (several) HEIs taken together can serve as the incubator for new HESPs based on ILAs.

From this double analysis, of conventional higher education and of alternative attempts, the following tentative *strategic corridor* can be derived:

- First focus: Building mutual awareness between the promoters of existing initiatives, and stimulating cross-cutting communication among them;
- Second focus: Creating mutual learning opportunities and enhancements between otherwise loosely coupled self-organising and self-maintaining small initiatives (e.g. by teaching each other's students, writing in each other's journals, devising criss-crossing team-teaching opportunities, engaging in smaller joint research and transformative practice projects etc.);
- Third focus: Intentional joint program development in trans-national multi-institutional consortia (second and third cycle, i.e. on the Masters and PhD levels, ideally thought together);

- Fourth focus: Creation of interfaces and overlaps between different programs from different consortia, weaving them together more and more (e.g. through joint virtual libraries, summer universities, mutually supportive research and intervention projects, and opportunities created for students to take courses from different programs).
- Fifth focus: Careful and flexible formal framing of the emergent requisite organisation for a series of HESPs based on ILAs which are distributed across several consortia, HEIs and countries (such an organisation would be largely a virtual overlay which leaves the host universities, their organisation and their conventional programs as they are).

The strategy proposed here starts with what is already there and doesn't worry about what is not there – according to the attitude of the Zen cook who is always able to cook a meal for the monks of his monastery on the basis of the ingredients available in the kitchen regardless which specific ingredients are actually available, have run out, or were never delivered. With this in mind, we can state that a whole bunch of tasty ingredients for the creation of HESPs based on ILAs is actually available in the “EHEA kitchen,” and even more if we consider the intercontinental global scale:

- A truly amazing number and diversity of HEIs exposed to a more and more international and competitive field which imposes a strategic approach to differentiation and cooperation, and which is likely to stimulate some open-minded rectors(presidents), deans and heads of institutes to consider more integral options, at least on the program level, in order to assure the advantages of being a first mover for their institution;
- A critical mass of serious scholars and academic teachers in many disciplines and countries – serious according to mainstream criteria – who are already inspired by ILAs, a sufficient proportion of whom are intrinsically motivated to engage in the extra workload of building new programs;
- The courses they already teach which reflect a more or less integral flavour, or at least new ILA-based courses which they are basically able to teach after a short period of preparation;
- A critical mass of students wary of the programs on offer and eager to get a more ILA-based higher education (some consciously, some intuitively, and many who would discover their respective inclination if appropriate programs were on offer and could be compared to more traditional programs).
- At least some funding programs more departing from the (still dominant) traditional ways of funding and more tuned or at least open to innovative, transdisciplinary and collaborative approaches.
- Various experiences with more advanced (and challenging) forms of teaching courses in and for boundary-crossing settings: international/global, cross-domain, multilingual, collaborative, multi-level, blended (virtual / face-to-face) learning, bringing traditional and non-traditional students and teachers of various origins together.
- Various boundary-crossing scholarly discourses within and close to ILAs, and their fallout in journals, books, conferences and research projects.

Put like this one could say, perhaps not without a certain astonishment, that at this stage, i.e. right now, in the EHEA all the essential ingredients that are required to cook tasty meals called HESPs inspired by ILAs are already there: students, teachers, courses, HEIs, advanced

boundary-crossing teaching and learning approaches, theoretical backgrounds, and some potential funds. Well, then, why the hell don't such new programs pop up all around us and be served on silver plates to the students queuing in front of the restaurant? This is quite evidently far from the case. So, what's the problem? *What is not working*, or who?

Well, the Zen cook ... He doesn't cook. Why doesn't he cook? He is supposed to cook! Where is he? What is he doing instead? ... He is looking for the magic k... The magic k? Yes, the magic k. He knows, the k must be there, in the kitchen. It was always there, but so rarely used that nobody missed it. His guess is that it might have fallen under the sink. He is looking there, but he has to tidy up the mess first. Just imagine! While the angry teachers are hungry, the students queuing, the funders looking for breakthrough ideas, the institutions running almost amok in a never-ending cycle of pseudo-reforms, our cook is calmly tidying up the mess under the sink in order to find the magic k - with a smile on his lips, of course. And indeed, after a while, in the midst of brushes, towels and soap, there is a piece of a page stripped from an old journal. It actually contains the magic k. The cook takes this piece of newspaper as if it was the most precious thing on earth and puts it carefully on the kitchen table. He adds it to the phrase that was in everybody's mouth: What is not working? Once the magic k is added, it now reads: What is knotworking?

“Knotworking” is a concept Yrjö Engeström has introduced to capture yet ill-understood emergent forms of collective intentionality and collaborative work departing considerably from the well-known traditional models of organisation, like face-to-face teams, markets, the governance hierarchies of bureaucracies, membership-based NGOs, or even circumscribable informal social networks. Knotworks have unprecedented, emergent characteristics that cannot be reduced to those of teams, organisations, networks, or networks of organisations or networks of networks upon which they build. According to Engeström knots are “*rapidly pulsating, distributed, and partially improvised orchestrations of collaborative performances between otherwise loosely connected actors and organizational units.*” These performances can be extremely productive and innovative without any determinable and localisable centre of control or authority. “*The locus of initiative changes from moment to moment within a knotworking sequence*” brought about by “*interagency connections and reciprocations across boundaries*” that are “*focused on and circling around a complex object.*” It is precisely the capacity to maintain and develop a shared even though shifting complex object – as for example HESPs inspired by ILAs – without any centre of control which makes knotworks different from formal organisations and informal networks in the generation and accomplishment of collaborative work. The readiness to loose rather than gain control, and the “*rejection and deviation from standard procedures and scripted norms are foundational to the success of such amoeba-like formations.*” The new communication and information technologies play a catalytic role for this new type of collaborative work as does the individual cultivation of a specific kind of decentered awareness which allows the recognition of weak signs and complex patterns which would otherwise remain unattended or invisible. “*The efficacy and value lay in their distributed agency, their collective intentionality.*” This distributed but focused collective intentionality can be considered an asset, a new kind of capital (beyond

economic, symbolic and social capital). This distributed, “*collaborative intentionality capital*”⁵⁰ has not (yet) been grasped in its tremendous importance for collective value creation, collective innovation and transformative capacity by the more bounded and stable organisations and the mindsets sustaining them – and quite probably it cannot be grasped and used by them unless they become transformed themselves through the attempt to grasp and make use of it.

Knotworking between academic teachers, students, administrators, funders ... across domains, languages and countries and across the entire range of ILAs is yet seriously and self-contradictorily underdeveloped by promoters of anything integral in academia, even though there are first upcoming attempts. Indeed, we need to put the ingredients together, otherwise nothing substantial happens, at least nothing making it up with the tremendous challenges and urgencies of our era. Without such *knotworking* across academic ILA communities the teachers and the students and the whole society will become more and more hungry and desperate in front of the larder which turns out to be actually ... plain!

The first effect of *knotworking* is to discover that there are many more people interested or already engaged in developing a more integral higher education, and that waiting and preparing was good, but now time has come to act. This can help to redirect latent action potential and to disclose past experiences, current initiatives, and future plans and projects to each other. When this happens the second effect of *knotworking* can be to realize that one is not constantly in charge, but a whole, energizing field moving and moved by multiple actors in multiple places. This requires and allows us to become aware, moment by moment, of one’s unique contribution to this field, and to deploy the right action (or non-action) in the right moment. This mindful awareness can be cultivated individually and collectively⁵¹ and prevents loss of direction, motivation, and energy. It rather provides direction, motivation and energy. A third effect of such field-aware *knotworking* then can be the experience of being “plugged-in” more constantly, to “simply know” the movements of this field by one’s whole multidimensional being, to wholeheartedly trust this flow and to follow its calling without delay. This can be very enthralling and re-enchanting, and contribute to attract additional actors resonating with a *knotworked* style of learning and working.

Conclusion

Most existing HEIs offer physical and digital infrastructures, values protecting a certain level of academic freedom (concerning research and teaching), degrees of a certain reputation, and flexible margins allowing at least some experimentation. The flexible margins of several HEIs taken together enhanced through state-of-the-art information and communication technology and

⁵⁰ All quotes in italics are from Engeström (2005).

⁵¹ Many practices are available to figure out and enact collective intentionality from a deep level connected to transpersonal fields of consciousness, like David Bohm’s (Bohm, 1996) dialogue approach, Gerard Endenburg’s (Endenburg, 1998) sociocracy, systemic constellations (Horn & Brick, 2005), Arnold and Amy Mindell’s process work / world work (Arnold Mindell, 1995; Arnold Mindell & Amy Mindell, 2001), and Otto Scharmer’s presencing (Scharmer, 2007; Senge, Scharmer, Jaworski, & Flowers, 2004), to name just a few.

diversity-proven andragogical approaches are even more flexible and ... even more marginal. This marginality isn't negative at all. Being part of *and* being marginal to traditional HEIs at the same time is actually quite a good and appropriate "place" for the implementation of new HESPs inspired by ILAs beyond the traditional dichotomy of being inside *or* being outside. A layered, developmental strategy can help to move from isolated initiatives to mutual sharing to implementation of single programs to an intentionally interwoven ecology of programs inspired by ILAs. As people, organisational units and initiatives engaged in developing and implementing HESPs inspired by ILAs are quite loosely coupled, and will generally tend to stay loosely coupled to maintain their specifics, new approaches to cross-stream and cross-initiative collaboration are called for (in addition to new content, new educational approaches, and new contexts of implementation). It is suggested that the cultivation of knotworking awareness and capability is called for to take advantage of the already existing critical mass of scholars, students, courses, and research inspired by ILAs. This implies that the development and implementation of HESPs inspired by ILAs in the EHEA presupposes a well developed integral consciousness of the early promoters as much as the development and implementation of such programs is supposed to catalyze the emergence and stabilization of an integral consciousness in the participants.

Contours

In the coming century, there will be an urgent need for scholars who go beyond the isolated facts; who make connections across the disciplines; and who begin to discover a more coherent view of knowledge and a more integrated, more authentic view of life (Boyer, 1994, p. 118) ... the academy must become a more vigorous partner in the search for answers to our most pressing social, civic, economic, and moral problems and must reaffirm its historic commitment to what I ... call ... the scholarship of engagement. (Boyer, 1996, pp. 18-19)⁵²

Based on the insights developed in the prior sections we can now attempt to tackle the core task which is to say something about the future of a more integral higher education in Europe. My attempt in this respect isn't magic for two reasons. The first is that the goal is not to predict but to enable such a future.⁵³ The second is the consideration that the future takes place already now, at least somewhere, and in some respects, and thus can be observed like other empirical objects. We can go even further saying that parts of our future took place in the past. That means that some future-enabling features were actually already implemented in the history of higher education and have then been weakened, supplanted or forgotten altogether. This doesn't mean to revive an imaginary golden age because there was no such golden age of higher education. But many ILAs converge in claiming that certain features from all former eras can be valorised and adapted to contemporary situations. At the same time these worldviews bring with them

⁵² For scholarship of engagement see as well Ven (2007). Ernest Boyer was Chancellor of the State University of New York, United States Commissioner of Education, and President of the Carnegie Foundation for the Advancement of Teaching, he received numerous awards and honorary doctorates.

⁵³ According to the famous phrase of the French writer and pilot Antoine de St. Exupéry who disappeared at the end of WW II: "Pour ce qui est de l'avenir, il ne s'agit pas de le prévoir, mais de le rendre possible."

other features which have to be limited, contained, and transcended in the light of later cultural achievements and future requirements.

In this perspective the attempt is made in the following sections to flesh out core features of early medieval, modern and postmodern higher education systems and to recompose and to go beyond them in an innovative integral vision of HESPs. This attempt is based on the material compiled in the tables in the appendix and helps to paint the contours of HESPs inspired by ILAs within the strategic corridor already specified. These contours are rather general and can be concretized in manifold specific ways. For accomplishing this task lenses frequently employed by ILAs are quite helpful, like individual developmental trajectories, cultural contexts and evolution, place, space and time, and the relationship between theory and practice. I will proceed stepwise and first spell out some *principles* required for ILA-based HESPs to be true to themselves, then address questions more specifically related to creating committed *learning communities*, and finally turn to *integral andragogical approaches* and *integral organisational development*. It will appear from the perspective of ILAs that community, andragogy and organisation are different angles of the same process concerning the same group of persons. This stands in contrast to the fragmented vision and practice in most of contemporary higher education in which these are different processes enacted by different groups of persons in different contexts.

Principles

A HESP inspired by ILAs, if it is meant to be coherent in the sense of practicing what is preached, must be designed along at least the following highly interconnected principles:

- *Scientific Quality Development*: Needless to say that in any HESP based on ILAs first and foremost the existing principles and quality criteria of academic research and higher education need to be respected and attained. The goal is not only to stick with existing standards, but to go beyond them and to develop and comply with standards derived from the broader views provided by ILAs, among which are the conscious attempt at raising awareness for, balancing, and mutually enhancing breadth *and* depth, individual excellence *and* collective intelligence, values *and* facts, theory *and* practice, micro- *and* macro-levels, the views of the history *and* of the future, first-order (empirical) *and* second-order (meta-studies) research, etc.⁵⁴
- *Transformative Purpose and Commitment*: HESPs based on ILAs serve at least three higher intertwined purposes. They should contribute i) to substantially and immediately catalyze constructive transformation in society, ii) to serve as scalable showcases of higher education transcending (post)modern assumptions about and conditions for learning and iii) to support all the individuals involved (teachers, students and other stakeholders) in understanding and deploying their unique developmental trajectories according to their deeper vocation (Gidley, 2007; Glisczinski, 2007; Harvey & Knight,

⁵⁴ Little work on quality standards for integral research and integral higher education has been done so far. However, for the process of institutionalisation specific, explicit and more widely shared quality standards and quality development approaches including and transcending the traditional expectations are of crucial importance.

- 1996; Lessem & Schieffer, 2008; Maxwell, 2007; O'Connor, 2002; O'Sullivan, 2002; Reason & Torbert, 2001; Schugurensky, 2002; Weaver, 2008).
- *(Self-)critical Reflexivity*: The cultivation of constructive critique is considered as an integral part of individual and collective self-transformation. Accordingly, issues of contemporary local and global import and impact are addressed with critical reflexivity, as are in turn the worldviews, theories, models, methodologies, interpretations etc. used to address them. Targets for self-reflexivity and critique are the objectives, principles, roles, rules and regulations, standards and procedures of the study programs themselves, and the implication of students and teachers in their unique learning trajectories and their collaboration (Brockbank & McGill, 2007; Kenny, 2008; Moon, 2004; Schön, 1983; Tanaka, 2002).
 - *Integral Pluralism and Dialogue*, i.e. a sustained attempt at the inclusion of a diversity of persons and perspectives in research, learning approach, organisation, and intervention etc.. Accordingly, such a study program can never be confined to a single paradigm, worldview or school of thought and is called to actively foster dialogues between different streams of ILAs and between ILAs and other paradigms, and between higher education and society. This should be cultivated with a scope which is creating and strengthening cross-cultural and cross-civilizational planetary dialogues (Dallmayr, 2010, 2003; Gidley, 2007; Giri, 2006; Molz & Edwards, 2010; Tanaka, 2002). A particular emphasis of dialogue, bridge-building and integration is necessary in our times to counterbalance the particularly strong institutional and intellectual forces of fragmentation (like nationalism, hyper-specialisation, extreme relativism, and the various reductionisms). Part of this principle is a deliberate approach for sharing, open access, and contribution to the global knowledge commons (Hess & Ostrom, 2006).
 - *Organisational Learning and Participation*: Study programs based on ILA's necessarily follow core tenets of organisational learning and of lifelong and lifewide learning of its stakeholders. The organisation has to be designed in all its aspects to stimulate and integrate feedback loops within and across organisational levels (individual, small and large group, community, organisational and inter-organisational), across domains (beyond education extending to politics, business, religion, civil society, the arts and the media etc.), and across layers of learning (from single-loop learning to triple or maybe one day quadruple-loop learning). This is only possible on the basis of strong approaches to participation and unleashing of collective intelligence and wisdom (Kenny, 2008; Kezar, 2005).

Integral Learning Communities

Building learning organizations, we are discovering, requires basic shifts in how we think and interact. The changes ... penetrate to the bedrock assumptions and habits of our culture as a whole. We are also discovering that moving forward is an exercise in personal commitment and community building ... nothing happens without "personal transformation." And the only safe place to allow for this transformation of the self is a learning community. So, we are coming to see our efforts as building "communities of commitment." Communities committed to create learning environments rather than follow recipes for success. Communities that embrace pragmatism and idealism, that address themselves to critical problems while sharing a vision as generators of rich lives rather

than as ends in themselves. Communities that search for meaning and transcend their selves, their organizations, and their world. (Kofman & Senge, 2001).

The constitution of intentional communities of learning, inquiry, practice and self-transformation inspired by ILAs depends on a sound answer to the questions who should be involved, how (which roles, rules, tasks and responsibilities), when, where and how long. Historically, higher education already underwent major transformations regarding these questions. At its very origins in Europe, the “universitas” was nothing else but (small, flexible, mobile, self-governed) communities of a teacher and his students, who spent quite amazing amounts of time together, somewhat like a family. In early medieval higher education it was common that a student choose his teacher, as this generally meant to engage in a longer-term interpersonal master-disciple relationship, and the participation in a specific community instead of another.

In modern higher education the student applies for a study program, and if (s)he is selected the respective teachers and fellow students are simply a given. Academic teachers on the other hand apply for jobs at HEIs and when they are selected in many cases they find themselves in a department with colleagues they never wanted to work with, and with students they are randomly flooded with. In some study programs selection of students is performed by a committee including the director of the program and perhaps some of the teachers. This allows for and even enforces some thoughts about student intake. In practice, however, more often than not, the selection procedure remains quite superficial, based on formal criteria or the usual game of application rhetoric. Scholars have generally little time to devote to the selection of their students, and students today generally select study programs and not teachers, with doctoral studies being partly an exception.

It comes as no surprise that under these conditions the traditional idea of a community of scholars and students based on intensive interpersonal relationships became more and more diluted and that in many places it is now completely lost. Students and academic teachers follow their respective duties, schedules, and trajectories, every student has many teachers, and every teacher great many students. The participants in different classes are not the same, courses are short, and there are many courses on different content to be attended within a week which is sliced up into pre-scheduled time slots.⁵⁵ This picture is quite characteristic for today’s mass higher education. Distance education providers allow for a more flexible organisation of time while often having pushed individualisation even further than campus universities. It can be questioned whether under these circumstances there is any collectively shared intentionality in a teacher / student group.

It should not be bypassed, though, that there are various attempts to revitalize the idea of learning communities. There is even a whole *learning communities movement* in educational research and practice (Gabelnick, 1990; Garrison & Vaughan, 2008; McNay, 2000; Wilson & Ryder, 1996). But first, this movement is not spreading widely, and second, under the structural conditions of mass higher education, individualisation, hyper-specialisation of scholars, and

⁵⁵ They are following on each other, however, in a rhythm and in time slots which in many contemporary HEI’s are still modelled upon medieval monasteries!

geographical mobility of everybody, the best intentions and the best practices can only have limited effects on restoring community for higher learning in the more original sense. The postmodern transition phase does not change anything to this state of affairs. The structural condition of modularization makes it even worse. At the same time the possibilities to create original new study programs are strengthened. If such a program is relatively small in size the creation of learning communities meriting this name become basically possible again, but it needs deliberate and sustained andragogical efforts to create and sustain them.

Students

All this being said, how could ILAs respond to this history of weakened and suspended community and integrate suitable features from premodern, modern and postmodern practices? How could the undeniable advantages of actual learning communities⁵⁶ be reactivated under contemporary conditions? I want to make several suggestions regarding student intake and matching between students and teachers that are questioning deep-seated assumptions on which contemporary higher education is built (before addressing the questions how to keep a learning community going in the remaining sections on integral andragogies and integral organizations). I argue in favour of much more mutually *elective* than one-sided selective procedures reconnecting with the ease of access in the earliest phase of institutionalised higher education. But instead of students selecting a teacher or a study program, and the other way round, the constitution of more authentic learning communities might better be based on emergent transformative projects whose orientations are shared and co-shaped by those interested in them (see section on integral andragogies).

How could this happen? This depends on the type of program. From a developmental perspective I would argue for at least two types of study programs to be designed to adequately spread ILA's in theory and practice. The first type offers introduction into ILAs for students with little prior knowledge but interested in discovering the horizon of ILAs. The second type would be designed for students with more substantial prior knowledge and more arduous and focused transformative motivations. The first type of program can be framed by multi-year strategic transformative projects pursued by a team of researchers and practitioners as part of their practice-based research and research-based practice. Students could engage in such flexibly designed framework projects with a negotiated focus. In this case, the usual approach of individual applications could be used, based, however, on challenging, multidimensional, reflective tasks stretching beyond simple motivation letters. The set of selection criteria should be extended, give unusual profiles a chance, and focus on cross-boundary life trajectories (across disciplines, cultures, occupations, theory and practice etc.), the record of social engagement and spiritual practice.

Instead of simply fishing for the individuals best fitting to the criteria, a stimulating balance of diverse backgrounds within groups of students should be targeted. The attempted balance shouldn't be handled dogmatically as in formal diversity policies working with quotas.

⁵⁶ Small-scale communities were actually the adaptive unit 99% of the course of human evolutionary history. Accordingly, sociality and learning within group and community settings is not only part of our cultural but as well of our genetic heritage.

Nevertheless, in order to engage a broad array of experiences and perspectives a pragmatic mix is looked for between male and female students, students with different prior studies and levels of professional experience, students from different cultural and social class backgrounds, younger and elder students, students with and without family duties etc. Particularly lively and stimulating learning communities can unfold from such original mixtures. Such a micro-cosmos creates the requisite variety (Ashby, 1958) reflecting global human diversity with which transformative projects have to deal. Instead of separating traditional and non-traditional students into separate programs they can enrich and challenge each other within the same learning community if the respective learning pathways are properly framed, supported and crossed with each other.

The approach to the second type of program is more revolutionary because it intentionally breaks with the individualistic bias Western higher education is built upon from the bottom to the top. The undeniable merits of individual-centric education⁵⁷ notwithstanding, a more communal approach is called for in the future, an approach sensitive to individual uniqueness *and* to powerful collective action at the same time. For this to happen I want to launch the idea of *collective applications*. A collective application is an application submitted by a group of candidates who i) make claims on their shared interests, ii) suggest the contours of a transformative project they want to work on during the program, iii) explain the complementary roles they think they can play in this, iv) specify the resources, expertise and contexts they think they need to realize it, and v) those they bring to the picture themselves as a unique team. Once again, some framing conditions regarding diversity should apply. Much prior work must go into such a collective application. But this is already a very valuable learning process in itself, independently from its being taken up and realized by those who imagined it in the first place. The contention is that in the light of lifelong learning and in the light of ILAs more learning in more people can be induced by any single HESP than the learning of the selected students only between the start and end of the program's duration.

Accordingly, it could be imagined that the process of development of transformative projects by teams of students and others can and should be facilitated prior, during and after enrolment in an ILA-based HESP. This facilitation is a service to the ILA-communities and to society at large. Such a task doesn't come into the focus or is rejected by the limits of the strictly formally conceived responsibilities and by the clear-cut time frames from enrolment to graduation in which conventional higher education has become institutionalised. However, it is sure that such a reflective collaborative process of shaping the contours of a transformative project before even taking up a study program fosters reflexivity, unleashes creativity, helps to clarify individual vocation and collective needs. It can eradicate the widespread lack of enthusiasm of enrolled students for courses of a study program they have "chosen" in the first place. It makes students fully responsible for deciding what and with whom to learn and to work. It is an entrepreneurial activity involving risk-taking. It requires a vision and a passion.

⁵⁷ The individualistic bias goes almost untempered from individual applications for individual participation in mostly individual learning processes assessed on the basis of individual performance to achieve an individual degree opening up an individual career. Being practiced for ages this appears self-evident to many. However, there are alternatives which at least should be discussed.

Such an approach makes better use of the limited time of the teachers. A recurrent observation I have made is that otherwise a good deal of the duration of a study program goes into clarification of why students are actually there and what they actually want to learn and what they actually intend to do with what they learn. The matching between the (often vague) motivations of the students and the (often narrow) focus of a conventional program happen to be poor in many cases whereas time goes by until this becomes evident. In addition, the few possibilities for career counselling are often not used, and if they are used it often appears that their institutional separation from the actual dynamics of the study programs and of the work life isn't very conducive to induce better matches. Such a state of affairs produces unreasonably high drop-out rates as well as attitudes of following-through with minimal effort just to receive the degree. Often the main goal of attending classes at all becomes reduced to the desire to socialise with fellow students, and to end up with a degree. Just doing what is prescribed to get a degree is a dry, lifeless goal, bypassing the richness of the here and now which discloses itself in the light of passion, love and commitment.

It is clear that only a minority will appreciate the approach of collective applications and will be ready and capable to engage in such a demanding process. But this self-selection and mutual election is precisely intended when such a collective approach is launched. Web 2.0 tools provide very good possibilities today to help matching those often isolated students (and teachers) who actually share ILA-based interests, attitudes and commitments. If this facilitation of the matching is scaled up to the entire EHEA, or even worldwide, this is already creating community before anyone has enrolled in a study program. The catalyzing effort is small held against its longer term benefits. Through the (multi-step) procedure of collective applications less applications of higher quality have to be dealt with. Applications not retained at one point of time for one reason or another can mature further, merge with other ideas, be realized independently, or be taken up by somebody else. Opening up the possibility of collective applications as described can evolve into a fountain of fresh ideas and insights in their own right.

An advantage of such an approach is that it makes much clearer what students actually desire to study and to achieve (and force them in turn to be much clearer about this) while boiling down individual fancy to realistic collaborative projects. The collective applications retained then contain valuable indications which unique program to assemble to make it a good fit with the spelled-out expectations of a specific group of students and with the transformative needs of society. Instead of fitting students without evident shared concerns into more or less ready-made programs this means dynamically fitting programs to student teams who actually share concerns and commitments. Collective applications could even be conceived by students who pursue different goals and who are at different levels as long as they are convinced on the merits of the emerging co-created project. Masters students and PhD students and participants not interested in getting a degree (e.g. because they already have one or because they are happy with being a social entrepreneur) could apply together as long as they share a vision and a mission and can discover how their experiences, competencies and inclinations (e.g. more research-oriented and more practice-oriented) can complement each other and coalesce in a joint transformative project of learning, life and work.

Another innovative feature could be, back to the origins of Western higher education in this respect, to skip deadlines, and allow for applications any time. Administrative deadlines often

prevent certain interested and interesting people to apply and projects to coalesce, because the rhythms from different contexts are kept separate or imposed and so prevented to supersede each other in more complex patterns. Especially in case of collective applications it cannot be predicted in advance when an application is ready to be submitted. This deadline-free approach would imply to allow for starting study programs more flexibly, according to actual needs and possibilities of an emerging learning community of students, teachers and other stakeholders. If the idea is to bring people inspired by ILAs and motivated to develop transformative projects together on a Paneuropean and global scale, this point is particularly important given that academic years, typical periods for exams and vacations etc. are not at all aligned across countries. For sure, administrations of HEIs won't necessarily accommodate to such a radical suggestion. If one doesn't want to permanently hit the limits of local time frames and their incompatibility with each other there is another good reason to guide our imagination toward a semi-autonomous overlay structure rather than a neat and total integration into any given HEI.

Facilitator

Now I want to focus on a key person in any learning community inspired by ILA's. It is the *coordinator* of the program. Dedicated coordinators for a specific HESP become more and more important in the complex, dynamic settings of postmodern higher education. They are complementing the traditional director of the program who oversees the academic quality and holds the institutional responsibility, and the secretary who is limited to administrative tasks. The coordinator dedicates most of her time to one specific program. Her tasks are i) guiding the students through the program from application to graduation and beyond (including alumni work), ii) providing access to resources, iii) administrating the online learning platform, iv) organising courses, events and assessment, and v) simulating quality assurance and quality development of the program. The need for a dedicated coordinator arises the more we are departing today from homogenous student groups following the quite stable, pre-established disciplinary curricula of modern higher education within a single HEI, and move to international student groups with different prior studies, to the many possible re-combinations of modularized and interdisciplinary curricula, and to cross-border consortia jointly sustaining a program. In the long run, success or failure of many of those more complex programs depend on having a dedicated, apt coordinator who has the overview and who holds everything together. The importance of such a position is still often grossly underscored.

HESPs based on ILAs are no exception to this new rule as they tend to go even further than postmodern HESPs with complexity, flexibility and heterogeneity, while demanding higher levels of coordination, coherence and integration. This implies that the coordinator is not only important but serves as a *key facilitator*. Accordingly, in addition to what a coordinator is already doing in a postmodern HESP, a facilitator in an ILA-based program must have knowledge about ILAs, and competencies in facilitation, individual counselling, team and organizational development, project management, public relations, intercultural communication, Web 2.0 tools and practice-based research. This rather impressive transdisciplinary profile being stated it becomes evident that such a position cannot be considered as an administrative position, nor as a position to be filled by recently graduated former students working on fixed-term contracts as it can be often observed. As it is the pivot of a HESP based on ILAs it should be seen as a full academic job opening up possibilities to evolve with research qualifications (e.g. through

practice-based research into the development of the program). The facilitator is framing and supporting but not directing the work of the students and their negotiations with teachers, funders and supporters. If one day a further move along the strategic corridor (see section on Strategic Corridor) can be actualised, and ILA-inspired HESPs start to cooperate on a regular basis, a coordinator of the coordinators and facilitator of the facilitators may eventually be required. This position is the only additional investment ILA-based programs require in the long run compared to postmodern programs when they are mature enough to create a more integrated offer.

Teachers

When it comes to teachers, who are they, where are they, what are they doing and how do they join the learning community of the students and their facilitator? If a collective transformative project is at the core of the curriculum teaching fulfils a different function than in the additive curriculum content delivery model. Teaching then comes in at least the following four forms:

- As a set of core teachings agreed-upon to create common ground regarding ILAs. A few teachers holding positions in the HESPs of the consortium running the ILA-based HESP can commit together to deliver the core teachings. The possibilities to create fabulous cross-cultural, cross-disciplinary and cross-stream core teacher teams scale up considerably when it comes to a consortium of consortia (last strategic step). Teacher teams (and team-teaching) creates interesting learning opportunities among teachers. Students may join the classes these scholars run anyway, negotiate specific classes, or engage in one-to-one exchange on more specific topics.
- As timely support for the unfolding collective project (e.g. for a method, a tool, or some domain-specific knowledge) based on specific demands rather than on regular pre-scheduled classes. Additional teachers may indeed be contracted for shorter periods as guest lecturers. This is already common practice. But what is specific in the present suggestion is that the students would be in charge, supported by the facilitator, of choosing them, of negotiating content and conditions, and of evaluating their intervention.
- As support to develop the individual profile and personal key competencies. In this respect students can be encouraged and supported in finding the most suitable teachers for their individual development all over the place, the world being full of teachers. Most of them are delighted to be approached by highly intrinsically motivated students in a targeted manner within the range of their unique expertise as this doesn't necessarily happen to them on a daily basis. A lot of teachers come into sight once the artificial limitation to faculty of the department running a program is falling: from young researchers to freelance researchers to retired professors, from artists to social activists to spiritual leaders, from entrepreneurs to consultants to policy makers.
- As peer-teaching between students, but as well of students teaching teachers, given the diversity of backgrounds, competences and prior knowledge.

It is evident that once more people are invited to teach on the basis of their passion, the teachers with institutional teaching roles can teach less and care more. This is an ongoing process which adaptively combines and takes advantage of the roles and positions of academic and other

teachers corresponding to premodern, modern and postmodern times. This process properly framed takes into account that:

- Modern higher education systems systematically produce scholars for whom teaching is not high on the agenda. Their careers progress on the basis of research excellence and not on the basis of teaching excellence. The invitation to contribute to student's transformative research-based intervention projects is actually closer to research and to expert counselling than to traditional teaching and might be more appealing to senior researchers who can take part in those projects at a level of involvement of their choosing.
- Teaching excellence in the spirit of ILAs is yet rare and geographically quite distributed. Students actively searching for teachers can substantially contribute to make connections on a European and global scale. A database helps to keep track and to support the dynamics of net- and knotworking which then is likely to become self-accelerating.
- Interpersonal relationship building and networking across domains and age cohorts is becoming more and more important. This is much more than a nice add-on or a romantic return to the origins. Today, it is well established that social capital built over years is often more important than formal knowledge for professional trajectories across the fractures and ruptures of postmodern economies true to the potential of a person.

Conclusion

Learning communities are a particularly suitable and flexible form and context of learning which allows to build and strengthen self-consciousness, imagination, complex situated knowledge, social relations, collective intentionality and action, simultaneously. Students, teachers and all other stakeholders form committed and intentional integral communities of learning, inquiry, practice and self-transformation. The communities should be as multicultural, multilingual and transnational as possible, and include and consider all stakeholders regardless their formal status and position as researchers, teachers, students and practitioners. Integral learning communities are serious about student-centeredness.⁵⁸ Integral learning communities conceived and nurtured according to insights gained by ILAs support students along their unique pathways of learning and help them to find the most appropriate teachers in any moment. From such a broad perspective committed learning communities are self-extending and self-transcending. They serve a wider community. Accordingly, they show the same characteristics as light which has to be considered simultaneously as small and focused corpuscles and as distributed waves.

Integral Andragogies

The utilitarian model of the university now prevalent and the humanist model differ sharply both in their goals and their basic epistemic conceptions. While the prevalent model functions as a conglomerate of service-stations with no common educational aim, the humanist model reflects the educational aim of enhancing the process of self-design. While the prevalent model is based on the relativistic–positivistic view that existential and

⁵⁸ Otherwise quite often reduced to a plastic word (Poerksen, 1995).

value issues are beyond the scope of scientific discussion, they are the very focus of the humanist model. (Aviram, 1992a, p. 405).

As we have seen, the reflections on how to constitute committed learning communities in higher education is already tightly connected to core andragogical concerns and to the question how flexible or fixed in advance teaching / learning patterns and roles can and should be. Once again a look back into the deep history of higher education can help to understand the task to shape more integral andragogies today. In the context of this essay this will be necessarily a sketchy undertaking and leave many features out. The goal is not to expose a fully-fledge ILA-based andragogy for higher education – this needs to be a long-term collaborative effort drawing on a wide array of streams and cultural contexts⁵⁹ – but much more modestly and pragmatically to present some elements that hopefully prevent to fall into the trap to self-contradictorily deliver ILA-content in a conventional pedagogical mode. If this happens it is fatal because the medium is as much the message as the message and the hidden curriculum then forcefully counteracts and subverts the unique contributions ILAs can make to higher education, research, and societal transformation.

For the purpose at stake a meta-pedagogical perspective is adopted. Meta-pedagogical means that various pedagogical approaches, if properly arranged can be complementary rather than opposed to each other. A meta-pedagogical view can help to determine or devise pedagogical approaches that are integrating otherwise separate practices into more tightly connected, meaningful and sustainable learning processes. This means i) to consider *curriculum* rather as *co-designed process* than as pre-existing structure, ii) to put *vocation, wisdom and commitment* centre stage rather than shying away from even talking about these issues, iii) take the information technology revolution seriously and as a consequence switch to *resource-based demand-driven learner-managed learning*, and finally iv) to depart from the traditionally split relationship between teaching / learning and assessment and facilitate integrated approaches as in *portfolios* used for *collaborative project-based service learning*. Once again I propose to cross-connect these aspects with each other and to cycle daringly back and forth from the early Middle Ages to now and tomorrow.

Curriculum as Co-Designed Process

The curriculum in medieval higher education was almost completely fixed in advance. Learning occurred strictly on the basis of the scholastic method. This was very much a theoretical affair separated from mundane practical demands. This monk-like seclusion was surely necessary in the first place for the rise of an autonomous sphere of knowledge which then became pervasively, and often for understandable reasons, called the ivory tower. The ivory tower still exists today. However, postmodern societal conditions make stronger demands on higher education in respect to accountability, more immediate usefulness, and self-funding. Accordingly, the ivory tower gets more and more holes through private-public partnerships, transdisciplinary action research projects, non-traditional students, online delivery, service learning, the recognition of practice-based prior learning, and the like.

⁵⁹ There are first upcoming attempts in this direction (Gidley, 2010).

The separation of the young generation of future decision makers from actual practice for many years during their studies raises serious concerns in a time in which professional practices are evolving faster than curricula can be reformed.⁶⁰ The modern idea of higher education preparing for life and work once in early adulthood does not appear very suitable when change and rupture in career paths becomes the rule in a lifetime rather than the exception. The postmodern idea of preparing rather for change and uncertainty (Barnett, 2000) is something to be retained while lacking any particular focus. The focus can be provided by the emancipatory and transformational ethical commitment of ILAs. Some modern ideas of the university, especially as they have been rarely or only shallowly realized, merit reappraisal as well. As an example, the Humboldtian vision of higher education was about the unity of teaching / learning and research. It didn't only mean that the teachings should be informed by the teacher's scholarly research. Von Humboldt's humanistic understanding of research was much broader than the contemporary hyperspecialists' conception.⁶¹ It didn't mean controlled laboratory research into exterior phenomena (however important they are). It was meant to be research broadly put, including one's own life and resulting in unique self-designed "experiments in living" (Aviram, 1992a).

Self-design requires opportunities for choice and participation on all levels regarding all determinants of the learning environment. Within the disciplinary curriculum of modern times the Humboldtian vision became actualised only in a very rudimentary and mutilated manner. Choice was reduced to minors and subdisciplinary specialisations. The current postmodern modularization hype undeniably brought about more possibilities for combining courses, but still the courses as such are generally givens mostly still inscribed in additive disciplinary and interdisciplinary curricula. However, endless possibilities for choice lay bare before us right now when leaving those historical limitations behind and considering everyone as a teacher, the entire world as the classroom, and the Internet as the textbook. This sounds unrealistic and revolutionary. But it isn't. Today, it is the perfectly realistic and realisable evolutionary next step andragogies based on ILAs need to explore as seriously and forcefully as they can.

Vocation, Wisdom and Commitment

This exploration requires an attentive navigating between Scylla and Charybdis. Scylla in this case are the restrictions inherited from an era in which strictly place- and institution-bound formal learning was adaptive because there weren't enough teachers nor enough pedagogical materials, restrictions, however, that have turned today into unreflected, self-reproducing, bureaucratic obstacles devoid of any defensible contemporary rationale (Aviram, 1992b). Charybdis in this case is the postmodern situation of endless consumerist choices which turn into arbitrariness, paralysis, loss of focus, sense and value. A third way can be found if we turn to a

⁶⁰ Under modernist institutional planning practices the start of the conception of a new study program (first and second cycle) is separated by roughly one decade from the first cohort of graduate students becoming operational in a field of practice. Until information from this field of practice is fed back and eventually taken up to substantially reform the curriculum and adapt it to actual requirements of professional practice it realistically takes another decade.

⁶¹ Who are often taken to break up the unity of research and teaching because their research is generally too specialised to be taught right away before the third cycle.

crucial perspective on higher education, taking the “higher” indeed very literally: the DIKUW holarchy in which *data* is transformed into *information*, *information* into knowledge, *knowledge* into imaginative and creative *understanding* and *understanding* eventually into *wisdom*, and the other way round when it comes to the enactment of wisdom (Ackoff, 1989; Maxwell, 2007). If we understand wisdom as the capacity to choose between or devise complex alternatives in an incorruptible commitment to what is good for the future of the whole, then it becomes evident that higher education cannot stop at producing data, disseminating information, conveying knowledge and facilitating understanding of the past. If already understanding cannot be taught but at best evocated, it is clear that wisdom cannot be learned like a subject matter. It can only grow by the sustained cultivation of a specific quality of individual and collective awareness enabling to “lead from the future as it emerges” (Scharmer, 2007).

Knowledge and understanding as educational goals can be transcended (and included) by at least two complementary moves that have to be carried out carefully around an inner space which cannot be touched and from which individual and collective creativity and wisdom can emerge: i) exploring individual *vocation* and ii) linking different vocations to each other in collaborative transformative projects intervening in a constructive and future-enabling manner in the ongoing societal macroshift. The notion of vocation has an interesting history downshifting its meaning or making it suspect, from the calling of the priest to modern “vocational training.” However, contrary to the (post)modern appearance vocation is not at all outdated. As a marvellous example, Frederick Buechner coined the famous phrase defining *vocation as the place where “your deep gladness meets the world’s deep need.”* Such an understanding of vocation transcends specific traditions, domains and age groups. It opens up a horizon of a potentially deep coherence between the individual and the collective beyond premodern social fixation, modernist career planning and postmodern patchwork nomadism.

Hence, a profound sense of vocation can be found in the 21st century. Talking and thinking about vocation, intuiting one’s vocation, laying it bare through collective care, and acting true to one’s vocation cannot be discarded from education. ILA-based andragogies are called to focus on vocation in this broad and deep sense. This makes their difference, their value, and their attraction. They need to develop multiple situated practices that are helpful for students and teachers alike to discover and stand to their vocation and unique contribution to collective endeavours, and the other way round to shape collective projects in a way which responds to the vocations of those contributing to them. This is an ongoing process not an achievement which can be made once and then fixed. By cultivating such a focus which was evacuated from most of modern mass higher education a strong sense of individual and shared purpose can unleash high levels of motivation and performance which can be sustained over long periods of time and across all kinds of challenges. As long as higher education is not touching this existential and motivational core of the human being it can barely be called higher either.

Resource-based Demand-driven Learner-managed Learning

As information represents a lower layer on the above mentioned holarchy, it is fundamental. In the very early medieval beginning of Western higher education the professor was lecturing from a book in reduced speed to allow his students to copy word by word what he said. This was an adaptive approach at that time as copies of books were too expensive for the average student.

As the curriculum was fixed and universal it was clear from the outset which books a student had to copy and to learn. This process, rooted in the constraints of a specific sociocultural and technological context, has institutionalised the plurisecular tradition of lecturing professors in higher education. Even though today lectures are not about reading a book aloud they are still pervasively given in higher education with much one-way communication. However, at least in the privileged countries, every student lives now in an extremely information-rich multimodal and multimedia environment of print and digital media. Lectures can be streamed or downloaded ... or replaced by other sources of information without any problem. The contemporary problem is not the scarcity of information input but the exact opposite, i.e. information overload. The problem is not to produce one's own handwritten copy of authoritative books through hard labour of teachers and students, but to pave one's way through an endless, messy ocean of contradictory information any parts of which can be infinitely reproduced by the lazy movement of a finger in front of a computer screen. Under these conditions much well-founded knowledge is necessary to be able to determine the authoritative sources in the first place. This is somehow a vicious circle. A teacher can do this work and convey his/her synthesis of a domain to the students through a lecture, but then the students don't acquire the information literacy necessary to do this on their own.⁶²

The entirely reversed situation concerning sources of information makes demand-driven learning more adaptive than the traditional delivery-driven education (Kirschner & Valcke, 1994). From an ILA-perspective this statement shouldn't be interpreted in absolute terms but in terms of the relative ratio between demand-driven and delivery-driven ingredients to one and the same learning process. If both ingredients are combined the delivery of input by teachers knowledgeable in certain domains can turn into suggestive stimulations. These stimulations tend to be better received and retained when they are less focused on sophisticated technicalities and more on providing orientation and overview that less expert people in a field cannot have. On the other hand, demand-driven learning requires unconditioning the passive habits developed through delivery-driven education pervasive in educational institutions which have not yet substantially transformed themselves to adapt to the contemporary information resource-rich environment. Demand-driven learning is very demanding – it demands inquiries into what one is looking for, i.e. it asks for learning about oneself – which brings us back to vocation, but at the same time about the community and the world, in multiple dynamically connected ways. It demands to develop and cultivate an attitude of continuous inquiry, of questioning, of paving one's way through the opaqueness of complexity by one's own efforts, intuitions and insights. It requires accepting not knowing, or even discovering not knowing as the source and natural environment of our islands of knowing.

The reintegration of inner dimensions into formal learning becomes inevitable on the basis of these insights. Even more so as today HEIs are losing very much their exclusive aura of granting access to sophisticated knowledge. More and more open access digital resources of academic quality are available today and more and more universities adopt an open courseware

⁶² Reflected in the well-known saying: "Give a man a fish, and you feed him for a day. Teach a man to fish, and you feed him for life."

policy making their course materials freely available over the Internet.⁶³ This means that there are ample opportunities to access and acquire academic knowledge without ever being enrolled in a HEI. As a consequence, in an age in which 24h per day broadband wireless Internet access is granted to students on the laptop campus and in great many other places the core concern of postmodern institutionalised higher education cannot be about information delivery any longer.⁶⁴ What actually remains from the traditional core of higher education are dedicated spaces for teacher – student and student – student interaction coupled with degree granting power. Open courseware doesn't deliver this core but just the fundament on which it is built. So let's focus on these interactions which are crucial for the learning of all those who are not auto-didactic heroes. The issue of degrees will be addressed later.

Under the above-mentioned premises, much has already been said about the required change of the role of the academic teacher from “the sage on the stage to the guide on the side.” But the old habits and scripts are deep-rooted on both sides, students and professors, and they are stabilized through the usual institutional inertia. As a consequence, the role expectations and practices regarding teaching and learning are evolving at a very slow pace in higher education. Typically, the age old blueprint is often still the dominant model. It consists of a conception of learning in three steps and settings clearly separated from each other: i) delivery-based teaching, ii) repetition and internalisation by the student, and iii) reproduction during final assessment. The standard script demands several smaller and larger cycles like this leading to a grade. In this respect there is continuity between early and modern forms of higher education.

Alternative ideas of student-centred, self-regulated if not learner-managed learning (Graves, 1994; Harrison, 2000; Ottewill, 2002; Wilcox, 1996; Zimmerman & Schunk, 2001) have not yet cracked this traditional version of a learning cycle at any larger scale. Many versions of these alternatives are themselves limited in practice in their actual student-centeredness or learner-directedness, as students called to learn under the conditions of implementations of such frameworks in actual HEIs rarely (co-)determine the whole set of parameters constituting their learning environment: when and at which pace to learn what and where with whom for which purpose, on the basis of which support and input, and when and how progress and outcomes are assessed. The usual institutional framings and understandings of student-centeredness generally allow certain limited moves but not others that would perhaps be more important for empowerment, participation, emancipation and self-transformation. The radical potential becomes right away domesticated (Taylor, Barr, & Steele, 2002).

Portfolios

However, many proponents of postmodern variants of higher education at least try to bring a different approach to the fore in which teaching, learning and assessment are better coordinated, or even more integrated, i.e. in which they are more coterminous and more continuous, and in

⁶³ Inspired by the pathbreaking “open courseware initiative” started by the Massachusetts Institute of Technology (MIT) in 2001 with more and more material made accessible to the global public since 2002 (see <http://ocw.mit.edu>).

⁶⁴ The responsibility in this respect is shifting rather strongly to lifting the financial, technical and organisational access barriers to protected digital libraries, archives, databases and repositories.

which their co-determination is more critically reflected in dialogues between students and teachers. An integrative approach to catalyzing, reflecting and assessing learning at the same time is the portfolio. It was originally limited to the art faculties but is spreading impressively across all domains and levels of education as postmodern conditions and insights spread. A portfolio is assembled and developed by the student herself. A portfolio allows focusing on strengths, working on the presentation of one's work, and fostering self-reflection on one's learning processes. These features make portfolios coherent with student-centred learning and the development of unique profiles. It can also contain the work submitted to traditional assessments and its results and it can stretch beyond the end of formal education into professional life. This makes portfolios a very flexible tool for self-assessment, peer-assessment, and expert assessment at the same time.

There are many variants of portfolios and of ways to work with portfolios. There are interesting possibilities to extend and transform the work with portfolios through an ILA-informed perspective. One extension would be to de-compartmentalise process and outcomes and to fuse online working environments with electronic portfolios, reflecting different stages of advancement of different activities.⁶⁵ Another extension would be toward a seamless "plug-in" integration of individual portfolios with team portfolios (including extended project documentations) with learning community portfolios with the presentation of the HESP and eventually of the umbrella organisation. This would wipe out with one stroke the usual annoyance of students with assessment and of scholars with contributing to annual reports, quality assurance reports etc. because the activities and the material are already properly presented at the right place from the outset and no extra and double work is needed. These extensions, among others that should be imagined, require new technical (digital) solutions⁶⁶ and new multi-layered and integrated andragogical practices. To bring this transformation about it cannot be circumvented to break with some very deep-seated habits. One example is that because of the individualistic bias groups or teams have rarely been considered as learners in their own right in formal educational settings.⁶⁷ Even less considered up to now are the inter-level links between individual learning, team learning, community learning, organisational and inter-organisational learning, and the global macroshift. If andragogies sympathetic with or rooted in ILA's focus their work on these underdeveloped links, in theory and practice, they can make an appearance with an unprecedented profile and deliver pervasively useful contributions to research and society.

⁶⁵ As they advance naturally from idea, to plan, to draft, to final version, to evaluated final version.

⁶⁶ Attempts in this direction are just about to emerge (Meyer, Sporer, & Metscher, 2009; Sgouropoulou & Skiadelli, 2008; Wolf, 2001).

⁶⁷ Kasl (2001) is one of the very few exceptions. Even in many strands of so-called collaborative or cooperative learning the individualistic bias remains dominant when the collective setting is mainly considered as a means to serve individual learning better. One major objection against team learning in formal education is that the individual contribution cannot be properly assessed, but of course there are many possibilities to assess team work on individual and collective levels. In work settings the situation is totally different. There is abundant literature on team building, team development, high performance teams etc., and a lot of valid research focusing on the team level as such.

Collaborative Project-based Service Learning

Within these considerations collaborative project-based service learning taking advantage of the latest advances in information and communication technology should be a highly integrated and highly flexible merge of andragogical approaches that can be specified in many ways according to conditions and opportunities at hand in a given context (Butin, 2005; Thorley & Gregory, 1994). Up to now, project-based learning, collaborative learning, service-learning, and blended learning evolved as only very partially intersecting autonomous streams of pedagogical and andragogical research and practice. Informed by ILA-frameworks, there are very good reasons, however, to consider them as facets of one integrated core stream of learning in and for the 21st century rather than as different approaches to be employed for different target groups in different contexts and at different occasions (Rowland, 2002; Shneiderman, 1998; Visser, 2001).⁶⁸

Project-based learning in its more simple forms probably goes back to practices developed in Italian Renaissance architectural schools, was reissued and revitalized in alternative education movements across continents during the last century or so, and is now more strongly re-entering higher education across domains, specifically in inter- and transdisciplinary settings. Accordingly, they suit particularly well to the cross-cutting issues ILAs are addressing. Learning through working on projects organically connects research-based practice and practice-based research, play and problem-solving,⁶⁹ history and future, creativity and discipline, first order (empirical and theoretical) research and second order (meta-level) reflection etc. It should be conceived as research-base practice and practice-based research. It is a self-designed learning activity producing multiple outcomes, among them tangible ones. Tangible outcomes are adding widely neglected assessment dimensions to self-, peer- and expert assessment, i.e. assessment by reality (what works, what doesn't work?), and once the service-learning orientation is included, assessment by internal and external stakeholders (do they feel served appropriately?). If service learning is occurring in collaborative projects, e.g. in terms of co-operative inquiry (Heron, 1996) or cognates, the above mentioned cross-level integration from the individual to the community and beyond is sustained. An inquiry project-based approach, especially if it is an ILA-based multi-year endeavour of collective transformation reaching out beyond the confines of the initiating group, is integrating several metaphors of learning otherwise held and practiced separately (if at all): learning as knowledge acquisition, learning as participation, learning as knowledge building, learning as life journey, learning as emancipation. Accordingly, multiple forms of learning occur in such projects concerning all dimensions of the human being.

⁶⁸ I am working towards such integrated conceptions from different angles (see e.g. Duchastel & Molz, 2006; Molz, 2003; Molz & Bauchet, 2005, 2006; Molz & Gidley, 2008; Molz, 2010).

⁶⁹ There are actually three major types of problem-solving which are often at odds with each other as they pertain to different activity systems (i.e. different mixes of persons, communities, roles, tasks, goals, incentives, urgencies and outcomes): solving of research problems, solving of practical problems, and devising policies. An important task of ILA-based problem-solving then is to be aware of this (necessary) differentiation, and to focus on the activity of meta-level bridge-building between research, policy and practice. A more fruitful relationship between these domains is one of the most important unsolved problems to solve across scales (local, national and global) for the achievement of a sustainable planetary civilization.

As collaborative project-based learning rooted in ILA's do not rely on a single metaphor of learning at least four otherwise intractable problems of the traditionally additive and now modularized nature of the (post)modern curriculum can be overcome: i) the integration of knowledge across courses, ii) the unsustainable results of purely intellectual knowledge acquisition, iii) the inefficiency of the factory approach imposing everybody to learn the same content at the same time at the same pace, and iv) the development of key competencies. For the integration of knowledge across courses the student is usually very much left on his or her own. It is considered a personal sense-making endeavour, or not even considered at all. However, it is not sure whether it doesn't fail more often than not and result in a fragmented understanding leading to fragmented intentionality and action.⁷⁰ How could students possibly succeed with the titanic task of creating connections and coherence which their (subdiscipline-bound) teachers don't even try to tackle by themselves? Nor do many of the teachers attempt to provide at least directions and tools to advance their students on a path of boundary-crossing understanding that they do not follow themselves. The burden on the students is unreasonably heavy in this respect, and the one on the teachers unreasonably light. If projects are conducted a practical integration of different domains of knowledge is unavoidable. In ILA-based HESPs this must be reflected by theoretical integration as one of the domains and responsibilities contributed by the core teachers. At the same time innovative practices arising from the projects are challenging the models, theories and frameworks.

Evaluation

It appears that collaborative project-based service learning takes a lot of time. This is undeniably true. But time requirements can only be measured against actual outcomes, and the fact that students tend to spend more time on projects they have co-designed than on rereading lecture scripts if they have the choice means as well that they learn more, more intensively and with more motivation. For this reason it can be assumed that despite the time requirements of longer-term ILA-informed collaborative service learning projects they are likely to outperform other pedagogical approaches according to their own criteria. But they do not only enhance learning of those participating in them, they provide at the same time an immediate service to society. This needs to be considered as an additional evaluation criteria when calculating the invested time and the invested resources. The actual outcomes – all the outcomes – need of course to be evaluated empirically. But to prove the gain in effectiveness, efficiency and ethics of such a highly integrated approach to higher learning there need to be some implemented programs first that subscribe to this vision.

At this stage the argument goes as follows: the ultimate test of evaluation is neither performative evaluation nor summative evaluation (however necessary and helpful both can be to sustain and canalize learning processes), it is confirmatory evaluation. Confirmatory evaluation concerns the learning achievements which are stabilising over a substantial period of time (e.g. five years). Quite probably, little learning from usual higher education would pass

⁷⁰ Isn't this the same state as at the beginning of the studies, but now graduated and probably proud of it ... ?

the confirmatory evaluation benchmark.⁷¹ It is much more likely that crucial insights linked to embodied experiences pass this test, experiences one simply never ever forgets again because they are saturated with passion, emotion, action, dialogue, co-being and –becoming,⁷² whereas specific strands of expert knowledge acquired through lectures and other forms of purely intellectual transmission are easily forgotten after exams took place, and unfortunately often even before.⁷³

If creativity, emancipation, wisdom and transformative practical impact rather than just “being knowledgeable about something” is the ultimate horizon for education, it might be difficult to design a test. However, the constant complex challenges related to collaborative project-based service learning make an individual’s passion and competence as much apparent as her limits and shadows. Once again a supportive community can help to enhance strengths and to integrate shadows. This makes actual transformation as a process beyond knowledge acquisition more likely than a curriculum circling around nothing else than knowledge for the sake of knowledge from assignment to assessment. Project-based service learning doesn’t prevent but enhances the adequate acquisition of more specific content knowledge. Being or becoming knowledgeable about many things is a condition and an outcome of project-based learning and work occurring in a learning environment open to the world if the projects are devoted to a worthwhile cause and deal with complex challenges.⁷⁴ Content-knowledge acquisition occurs on a continuous basis in the organic context of its use, i.e. linked to an exemplary understanding of what this or that piece of knowledge is actually good for.

The disadvantage from a modern perspective is that when running projects in learning communities you can’t say in advance which knowledge is acquired, by whom, and when. Another recurrent critique is that sophisticated knowledge cannot be learned on the fly and just-in-time, but must be built up over some time to be available when it is needed. There is some truth to this, but the impact is limited in learning communities. As in postmodern pedagogical approaches it is welcomed rather than abhorred here that everybody acquires different skills and different sets of knowledge. In a project different complementary knowledges can and must be injected and shared once a situation asks for them. If everybody did the same thing a collaborative project would cease to be a collaborative project because as any complex collaborative activity its success depends on an adequate level of division of labour. Collaborative project-based service learning as the andragogical approach for the core curriculum doesn’t rule out additional learning in individual, subgroup or large group settings occurring on more conventional instructional terms. Another critique is the free-rider problem.

⁷¹ But this doesn’t appear to the fragmented mind because none of the defenders of the “evaluation regime” are administering and nobody is passing such a confirmatory evaluation test. This only happens quite exceptionally for the fun of a specific TV show format.

⁷² This old psychological and pedagogical insight became more recently very much corroborated by results of neuropsychological research.

⁷³ This contention doesn’t imply that experts forget their expert knowledge, but makes a point which is akin to what Albert Einstein already said, namely that “imagination is more important than knowledge and that he “can never commit to memory anything that can easily be looked up in a book.”

⁷⁴ Another of Einstein’s famous phrases was: “Only one who devotes himself to a cause with his whole strength and soul can be a true master. For this reason mastery demands all of a person.”

The free-rider problem is only a problem in short-term project teams, and much less in longer-term committed communities working towards a shared, intrinsically motivated goal. In such longer-term projects the free-rider problem, if it occurs, can be addressed by appropriate facilitation and reflection, including individual counselling.

Today, the development of transversal key competencies like presentational skills, team work, foreign languages, ICT literacy, entrepreneurial initiative etc. etc. becomes ever more important (Fallows & Steven, 2000). Almost everybody agrees on this. But even many postmodern approaches do not manage to overcome modernist additive curriculum designs. The curious result is that they tend to simply add “key competence modules” to “disciplinary subject matter modules” in order to satisfy the requirement to develop key competencies. In doing so the requirement is only met in theory but not in practice, however, because adding further modules to an additive curriculum means i) either overburdening the students, or ii) skipping other modules, or iii) achieving lower levels of expertise development per domain, disciplinary *and* transversal. It is apparent that there isn't any attractive alternative among these three options. A crucial reversal of all this occurs when projects are not considered any longer as an add-on to a traditional curriculum confined to a specific module in which one is supposed to learn everything about project management or team work for example in a short period of time,⁷⁵ but when they are considered as the core of the curriculum supported by more traditional add-ons (some particularly concerning the development of a conceptual understanding of ILAs helping to connect and integrate knowledge bits). Then all the transversal key competencies are exercised on a continuous basis, provided care is taking that teams have a diverse composition and that reflection on the experiences and their relating back to relevant theories and models is properly facilitated.

Conclusion

Integral andragogical approaches and curricula are co-designed, enacted and continuously adapted by the participants in the learning communities described in the section before. They are interacting with other relevant communities and individuals on the basis of multilateral negotiation and anticipatory learning. As the processes of learning are taking place in an information-rich, relationship-rich blended context they can be dominantly demand-driven. The core of the curriculum is constituted by variants of collaborative project-based service learning supplemented by more traditional learning formats. These projects presuppose the cultivation of a sense of vocation and the analysis of societal needs. While enacting their vision of the good in terms of experiments in living the student-managed project teams reunite teaching, learning, working, living and multiple forms of assessment.

Integral Organisations

In an important sense, the University has had to be a disintegrative institution, despite the persistence of holistic rhetorics. However, to meet the intense challenge of globalisation and to match the volatility of late-modern (or post-modern) society, higher education will

⁷⁵ And forget about it again in the traditionally delivered disciplinary courses.

have to develop a new capacity not simply to build alliances with other institutions (in its own terms) but to reinvent, reengineer and re-enchant itself, to compromise its own integrity in order to allow a new configuration of 'knowledge' institutions to develop. (Scott, 2000, pp. 9-10)⁷⁶

At first sight, the implementation of such an andragogical vision informed, by ILAs and proposed to advance committed learning communities, doesn't seem to be realistic given the many intertwined constraints reigning in most contemporary HEIs. It is right that an appropriate organisation is difficult to realize because many requirements are at odds with pervasive practices and regulations within mainstream HEI's. My suggestion therefore was to settle on the margins, to dwell in the interstices, and to broaden them by linking them together across HEIs, domains and countries. Small interstices can be intentionally expanded into a *third place*. Realising a cross-border HESP can be based on the least common denominator and then result in a doubly, triply constrained space which is then on the verge to become uninhabitable. However, bringing several margins together in cross-border consortia can as well bear a more than additive result if it is guided by a strong vision. Then it becomes possible to make a specific use of the unnoticed unregulated zones, to be granted exceptions to rules, to invent innovative solutions resulting from border-crossing dialogues on the given constraints etc. Intentionally dwelling in the interstices (between disciplines, HEIs, countries) raises many organisational questions, among them those concerning i) languages and language policy, ii) infrastructure and support, iii) organisation and legal status, iv) degrees, v) quality and vi) funding. All these questions will be addressed in the remaining sections, following the already known procedure to look into history to better bounce into the future.

Regarding *languages* used in teaching the constitution of higher education as a system across political borders was possible in the Middle Ages on the basis of a lingua franca, Latin, as it is today again on the basis of another lingua franca, international English. During the intermediate "nation-state era" between those two "cross-border eras" national languages were institutionalised as the dominant and in most cases exclusive languages in use in higher education. This not only had the effect of closing down and reducing international scholarly communication (which never ceased, though), but it also provided a basis for a genuine development of the humanities and the social and educational sciences with characteristics tuned to specific cultural and institutional contexts which they reflect and from which they arise. The use of national languages in higher education was a conducive condition for democratizing access to higher education because completing post-secondary education didn't any longer depend on high levels of mastery of foreign languages.

In order to overcome the closure a series of bi-national cross-border programs were created in Europe in the last quarter of a century, actually working in the respective two national languages at the same time, some courses running in one, some courses in the other language. There are a few bilingual universities as well, but the language sections appear to be institutionally quite

⁷⁶ Sir Peter Scott serves as Vice-Chancellor of Kingston University in London, President of the Association of University Administrators, Chair of the Universities Association for Lifelong Learning etc.

separate from each other in most cases.⁷⁷ More recently, there is a movement in Continental Europe departing from the originally quite strict use of the respective national language in higher education and implementing study programs running entirely in English. The goal is generally to attract more international students (which would otherwise go the UK and the USA for their convenience). Multilingual programs are a rare appearance so far, but there are some examples. Their language policies and practices are not at all homogeneous, but generally the set of official languages is fixed in advance.

On this basis what can be an ILA-based approach to language use in a transnational HESP? Neither the exclusive use of a national languages nor the exclusive use of international English do justice to the complexity of intercultural dialogues and cultural knowledges (popular and academic). Between small national languages and English as a lingua franca there are a dozen or so widely-spoken languages sometimes more suited for conversations depending on the actual foreign language competencies of those actually learning, working and living together. The innovation could be to delink language use in a HESP inspired by ILAs from rigid language policies and to become responsive to the possibilities and limits of written and oral communication in specific contexts, learning communities, project teams and teacher-student-dyads composed by members of different origins. It is quite sure that this opens up new possibilities in many situations, and allows to find creative solutions combining in new ways any language shared among at least two persons, any approach to mediation and translation, and any facilitating organisational tricks.

The next point concerns the material and digital *infrastructure* of higher education. Interestingly, in the very beginning of the “universitas” there was no material infrastructure at all besides the book the teacher brought with him to hold his lecture. Teacher and students met wherever facilities were available, or if there weren’t any the lectures took place in the street, or in the home of the teacher. The core was not the place or building but the student-teacher relationship and the teaching. However, step by step the “universitas” became rather identified with the buildings in which the teaching took place on a more regular basis rather than with the community of scholars and students. Universities started to own buildings on the basis of endowments. Today, some large universities are like a town within a town. They are made up of impressive campus sites with myriads of specialized buildings, lecture halls, libraries, labs, computer centres, sports facilities, halls of residence etc. A virtual overlay has been adding to all this in recent years. Courses, counselling, even sometimes exams can take place online. Digital media repositories, e-administration, learning management and online conferencing systems allow to “de-materialise” entire HEI’s which than appear as distance learning providers, or virtual universities. Many different mixed forms between material facilities allowing for face-to-face encounters and online learning platforms and tools have appeared. They are subsumed under the summary label of *blended learning*. Blended learning allows for more flexible arrangements regarding time and place. It combines the advantages of real people meeting real people in all dimensions, at least occasionally, and the tremendous advantages of what has been coined Web 2.0.

⁷⁷ With the notable exception of the trilingual University of Luxembourg where I am currently located and in which languages are not confined to sections.

Inter-institutional HESP's can much more easily flourish when developing their own "online home" in terms of a digital portal and virtual community platform, independently from the host universities. Today, this can be realized in a very flexible manner at amazingly little costs, especially since more and more powerful open source software has become available specifically for the needs of the academic knowledge worker and for collective distributed learning, research and project management. ILA-based HESPs would be crazy not to make use of the best of breed of digital tools and media in order to realize one or the other variant of a blended learning approach. In order to bring together those students and teachers within the EHEA and beyond who really share ILA-related interests and motivations the online portal of any blended learning program is more pivotal than the location to which somebody is bound by job, family, or other obligations on the one hand, and the location of a brick & mortar HEI on the other hand. What a student actually needs, at least as long as the focus of a program doesn't require heavy lab equipment, is access rather than place – access to protected or dedicated online resources like online courses, online meeting, discussion and co-writing spaces, online repositories, reference databases and full text digital journals. Something that needs to be created – and can be created rather quickly under normal conditions – is an intelligent combination of access granted by the HESP to its dedicated virtual community site, and access to protected digital resources granted by the host universities' ordinary library and computer services.

Interestingly, on this technologically advanced basis it is possible to come back very much to the state of affairs reigning many hundreds of years ago when there were not many facilities at all. A permanent connection over the Internet being the baseline, the face-to-face meetings can be arranged wherever and whenever it is most convenient for those involved, according to their actual geographical distribution. For meetings the projects teams and communities can use the facilities of a partner HEI, but they are not restricted to this option. It must be said that many of the campus sites and buildings constructed in the second half of the 20th century are not of a particularly inspirational aesthetic quality. At the same time there are many very aesthetic and inspirational places which can host small-group gatherings. Some universities own specifically more remote facilities.⁷⁸ Some are run by hosts who are themselves inspired by ILAs. The gatherings can be scheduled as intensives; partners, friends and kids can be invited to travel with the participants and enjoy the site on holidays parallel to the meetings; meetings can be combined with interventions linked to the collaborative service learning projects and hosted by the practitioner-partners; participants who happen to be geographically close can create antennas, i.e. more permanent meeting places, etc. Many unconventional solutions appealing to unconventional people otherwise reluctant to engage in higher education (again) open up once we stop reasoning in terms of material infrastructures we have to use because they "are the university" – many more possibilities than we can imagine today. Overall, if the university is once again imagined and enacted as a specific community of teachers and students, on the basis of the advanced global ICT infrastructures, the participants can "meet continuously" regardless their physical location, and they can meet in the most convenient or the most inspiring locations, once in a while.

⁷⁸ The campus of the Arts, Health and Society Division of the European Graduate School in the Swiss mountains being an outstanding example (www.egsuniversity.ch).

To close this section on material infrastructures let me come back to alternative brick & mortar HEIs. If i) they come to exist, if ii) their leaders understand the overall strategic challenge described in this essay, and if iii) they are not completely absorbed by their own development processes, then they can serve as helpful co-initiators, primary hosts, test-beds, privileged locations for gatherings and strategic reflection. They can test models of how to best reconnect the domains of student affairs, academic staff development, curriculum design and infrastructures to each other and to higher purposes. They can show how a HEI can subscribe to organisational learning based on a participatory approach contrary to the zeitgeist.⁷⁹ And most important to the argument: they can strategically contribute to speed up the movement along the strategic corridor (see section on Strategic Corridors). This doesn't mean only giving but also receiving. If they become part of inter-institutional and international networks alternative HEIs can more easily broaden the array of study programs they can offer and they can gain access to additional sources of funding. They can gain reputation if these networks include conventional HEIs (even though the cooperation is not directly with the conventional HEIs but with the unconventional ILA-programs hosted in the interstices). Under normal conditions compared to conventional HEIs alternative HEIs will always be considered as less serious, less prestigious, less ancient, less this and that (and too esoteric, after all, as the stereotype goes). However they actually work, they are lost in the ranking race because the ranking criteria don't do justice to them, but nobody cares, and their faculty has a hard time moving back to conventional HEIs if they want to because they have been working on the wrong side of the divide. Given this prejudicial basis alternative HEIs don't generally have any immediate impact on the further development of conventional HEIs and the whole higher education system. They are already lucky when they are tolerated and when some day they get their programs accredited. As partners in consortia, however, at least the opportunity is created for conventional HEIs to learn from alternative HEIs and the other way round.

The emergence of HESPs inspired by ILAs as proposed in this essay is supposed to work with and without alternative HEIs connecting to this vision and strategy. Regarding a possibly emerging "consortium of HESP consortia" as ultimate step of maturation within the strategic corridor, an alternative HEI can suggest to assure the meta-coordination, but it can be assured as well by a lightweight independent organisation (see next topic below). According to the strategy espoused in this essay the need for such a central coordination and administration emerges only in the latest stage in the process. In contrast, when building a brick & mortar alternative HEI this need emerges right from the beginning. In that latter case the growing central administration must be continually sustained across fluctuating levels of funding and made adequate to a fluctuating number of students. If a crisis occurs and the administration has to be reduced the whole structure risks to become dysfunctional and break apart. In the former multi-layered and distributed case, however, the umbrella layer can be very small; a single position can already have the desired synergetic effect, and even in case this person ceases working the autonomous constituent programs can be kept running as before on the basis of their own organisational base and history. This characteristic is modelled upon evolutionary system dynamics and makes the suggested moves within strategic corridor (see section on strategic corridor for building integral

⁷⁹ Paradoxically, there are many organisations of learning (schools, universities etc.) that aren't a learning organisations! The possibilities for participation have been further reduced with the introduction of the managerial university.

higher education) much more robust and flexible than niche alternative HEIs can possibly be in Europe in the time to come.

If it comes to the *organisational formalisation* of inter-institutional blended learning HESPs, at an early stage normally a relatively short cooperation agreement between the participating HEIs is generally sufficient. As this has become a common practice in the EHEA that is spreading more and more widely, there are many examples which can serve as a model. However, usually, it takes some time until each concerned central administration is ready to sign such an agreement. A good strategy is to start with any two partners who are ready and to expand the consortium once others are ready to join. In the meantime their representatives can contribute as teachers to the learning community as this doesn't require any specific inter-institutional agreement.

It is quite widespread that inter-institutional and international study programs give birth to a student and alumni association. Once we consider extending the goals of such associations and admitting teachers and other stakeholders as members such an association could actually serve as the organisational container for the integral learning community and for the maintenance of its "window" (the virtual community portal). If we consider that originally teachers and students were organised in guild-like self-governed corporations with everybody having a say, it is worth considering such study-program related associations as a means to come closer to this again, especially so as we have probably arrived at the historically lowest level of collective participation in the decision-making processes within HEIs.⁸⁰ On this basis it becomes clear that organisational development of HESPs rooted in ILAs is likely to be at odds with the usual organisational dynamics within mainstream HEIs – one reason more to decide to rather dwell in the interstices and to create a (lightweight) extra-layer which then can be more self-governed.

In case one day several ILA-based HESPs developed by different consortia or HEIs start to cross-connect and eventually want to establish a more formal organisation according to the next stage of the strategic corridor, European law offers a very suitable but little known legal status: the European Economic Interest Grouping (EEIG). The name is somehow misleading, though. The EEIG is not supposed to produce profits. It is just a legal entity for the coordination of shared interests of its members and for pooling resources and power to act. The idea is that different types of organisations, like associations, foundations, companies, universities, even

⁸⁰ The modern professorial university has reduced the opportunities for participation of the students, and the postmodern managerial university has even reduced the actual influence of the professors. So, why shouldn't students and professors wary of this situation experiment with other approaches to organisation and decision-making regarding the affairs of teaching, learning and research they are concerned by together? Most ILAs hold a genuinely participatory worldview while developing an understanding of the problems with both undifferentiated egalitarian and undifferentiated hierarchical models of decision-making. One way to deal with this tension is to grant decision-making and representation power as a function of genuine trust, of somebody's record of engagement with organisational development and of competence and experience related to specific areas, without emphasizing unnecessarily formal position- or status-related criteria as it is strongly the case within conventional HEIs. Approaches like sociocracy (Endenburg, 1998) can leverage collective intelligence and bring about more inclusive, more adaptive and more agile organisations.

individual freelancers from different European countries, can formally join under one umbrella structure to work for a common cause. The member organisations maintain their full autonomy while coordinating some of their activities with each other. Contrary to other legal entities the headquarter of an EEIG can be moved from one country to another according to arising requirements without need to refound the umbrella organisation. Another considerable advantage is that no capital is needed to found an EEIG, and it is relatively easy to set up from a formal perspective. It is an extremely flexible and adaptable legal status that is providing full rights of contracting with other legal entities. It can integrate any new member organisation interested in ILA-based higher education provided it is located within the European Union.⁸¹ The point here is to show that from cooperation agreement to association to an EEIG-style umbrella organisation, levels, scope and intensity of coordination between individual and organisational actors can evolutionarily scale up sustained step by step by adequate organisational forms and legal entities. It is important to realise that besides the basic anchoring through an inter-institutional cooperation agreement which is a very usual procedure this can happen quite independently from the heavy organisational and bureaucratic mills inside HEIs in a smooth, self-determined and lightweight manner.

Even in the final stage such an umbrella organisation would of course not have a *degree granting power* on its own. It could only issue “ILA-studies certificates” in addition to the degrees granted by the consortium running any single program, certificates which would need to make the proof of their value in the long run. This is not an unusual approach, though. Many consortia in many fields do this. The combination of a joint degree of traditional HEIs with a specific certificate from a higher education consortium testifying an ILA-based learning trajectory is likely to gain a better status and recognition than a single degree from an alternative HEI.

Together with its relative institutional autonomy the degree granting power is the single most important defining characteristic of the Western university. Until today a higher education degree generally has more prestige than other certificates of higher learning, despite the dramatic proliferation of degrees and degree holders. Originally there were identical degrees all over Europe, and they only served for admission to a teaching position at the university. They weren't a requirement to enter a profession or to be eligible to an institutional position outside of the university. Slowly they became an advantage in this respect, however, and eventually, with the modern university, an unconditional requirement. The unity of the degrees was destroyed with universities becoming integrated in national higher education systems, and with the tight disciplinary specialisation of study programs. The Bologna process has now structurally re-harmonized the degree levels, but the diversity still flourishes with a new wave of creativity concerning the development of new interdisciplinary study programs. The generalised diploma supplement is thought to reflect unique pathways within a common scheme. The diploma supplement is very useful for HESPs based on ILAs because of the absolute unique trajectories which are encouraged by them. The diploma supplement might even be extended according to ILA-based reflections.

⁸¹ There are easy workarounds, though, for partners located elsewhere.

If in the USA higher education degrees in integral and transformative studies as such are issued, there are no such examples in Europe as far as I know. The question is whether generic degrees like this are helpful on the job market or otherwise useful. There are too few HEIs and research centres dedicated to ILAs and ILAs have no common identity and label. Accordingly, there is almost no specific job market for ILA-inspired scholars other than the one related to the discipline or field their work comes closest to. On the general job market unspecific degrees are generally disadvantageous compared to specific degrees (disciplinary or professional). A specific focus and a well-known denomination make it easier as well to get a HESP accredited in the first place. A domain-specific degree however doesn't reflect sufficiently the boundary-crossing ambition of ILAs. One solution is to combine well-known degrees with a specification, like integral health, transformative leadership or transdisciplinary sustainability, to take three existing examples. This might work best under the current conditions, but i) doesn't help with forging a common label allowing immediate cross-program recognition, and ii) doesn't do justice to those who are attracted to ILAs because they allow for study across disciplines and fields rather than to stay in the confines of the usual fragmentation of knowledge and practice. Overall, it appears that some thought has still to be invested to determine how to label degrees related to studies of ILAs in an adequate and promising way.

The worth of the degrees does not only depend on an adequate labelling but of course more basically on the *quality* of the study programs. There are paneuropean standards for quality assurance in higher education.⁸² HESPs based on ILAs should strive to comply with them as soon and as well as possible. As these standards are of a very general nature this is not much of a burden if a program is well-designed from the outset. New programs should go through the accreditation process of one of the accreditation agencies listed in the official "European Quality Assurance Register for Higher Education."⁸³ Such an accreditation is based on a self-report, a site visit of a peer panel, and (in case of re-accreditation) student's course evaluations. The challenge is the same as with all ILA-based activities within an otherwise disciplinary landscape: uncertainties and problems can result from peer reviewers not being actual peers in respect to an authentic understanding of ILAs and of the andragogical and organisational approaches they require and pursue. In any event, from an ILA-perspective the accreditation is only the beginning and not the end of an ongoing quality development based on a participatory process. Care must be taken not to fall into the trap of separating external evaluation for the purpose of accountability, and internal evaluation for the purpose of improvement, a daunting split which too often turns the issue of quality assurance into a bureaucratic nightmare eating up precious resources which then cannot be devoted to the students any longer.⁸⁴

The final question to be treated regarding organisational issues concerns the *funding* of such programs. No doubt, funding of innovative HESPs is not easy. My argument here was, however, that there is not more money necessary for HESPs following an ILA than in other postmodern

⁸² European Standards and Guidelines for Quality Assurance in the European Higher Education Area (www.enqa.eu/files/BergenReport210205.pdf)

⁸³ www.eqar.eu

⁸⁴ For this systemic reason which cannot be seen, the fragmented responsibilities and practices in HEIs it happens, indeed, that the introduction of formal external quality assurance systems meant to improve quality are actually reducing the quality of teaching and learning.

programs relying on a coordinator. If such a program is hosted by a public university it can already start with the baseline funding, administrative support, facilities and access to digital resources provided for any other program. As already said, in Europe tuition fees cannot be that high and so other sources of funding are absolutely indispensable. An application to an adequate European funding program, like Erasmus Mundus,⁸⁵ should be attempted, as well as for a kick-off grant by a private foundation. Actually, all the traditional funding possibilities taken together are employed.

In addition to this, a model originally invented to pay back scholarships is well worth a thought. In this model contracts are concluded at the beginning of the study program in which it is agreed, as a freely chosen engagement, that a small percentage of the future income of the graduate is returned to the study program on a regular basis (e.g. yearly) if the income exceeds a certain baseline. This model, once it is built up across a couple of student generations, can generate a constant flux of financial resources. If it is generalised, in the long run it institutionalises intergenerational solidarity (the established seniors helping the next generation to make their way), and makes such HESPs more viable and independent. Inviting students to contribute in ways which are not burdening them with debt is a good idea which can be even further developed. Let me introduce another example: PhD students who receive a scholarship can serve in return as scouts for detecting new opportunities to apply for scholarships for the next generation of PhD candidates. As a rule, the collaborative service learning projects should as well seize opportunities to achieve a certain level of self-funding after an initial phase. The spirit of social and knowledge entrepreneurship to be cultivated departs from the dominant three solutions of i) students taking advantage of but not appreciating tuition-free public higher education true to the phrase “what is free has no worth,” of ii) consumers who pay for (private) higher education as for any other service and expect an appropriate service in return, and of iii) those who pay high tuition fees without having the capital to do so, and who then pay back a loan to the bank for great many years after graduating. Instead of paying interests to a bank why not directly supporting future generations of students? A spirit coherent with ILAs is a caring one attempting to use available resources economically while expanding them through creative collaborative entrepreneurial activity rather than simply consuming them.

Conclusion

The organisational and regulatory (infra)structures should adapt to the needs of the learning communities they are supposed to serve – and not the other way round as it is often the case. The organisational framework for this must be particularly flexible to remain responsive to the learning communities and their projects, however they are shaped and distributed, and however they decide to work and evolve on the basis of their self-direction, self-governance and service-delivering project work. They should enable a blended learning approach, and help to sustain collective social entrepreneurship while responding appropriately to institutional requirements like quality assurance. It has been shown that appropriate legal entities exist for all levels of organisational unfolding along the strategic corridor, and that there are some innovative ways to tackle the hot issues of language diversity, decision-making and funding.

⁸⁵ See footnote 38.

Call

Sometimes it is easier to live with the comfort of despair than with the challenge of knowing that change can happen despite the inertia of organizations. But there is another avenue toward change: The way of the movement. I began to understand movements when I saw the simple fact that nothing would ever have changed if reformers had allowed themselves to be done in by organizational resistance. Many of us experience such resistance as checkmate to our hopes for change. But for a movement, resistance is merely the place where things begin. The movement mentality, far from being defeated by organizational resistance, takes energy from opposition. Opposition validates the audacious idea that change must come. ... The genius of movements is paradoxical: They abandon the logic of organizations in order to gather the power necessary to rewrite the logic of organizations ... What is the logic of a movement? How does a movement unfold and progress? I see four definable stages in the movements I have studied —stages that do not unfold as neatly as this list suggests, but often overlap and circle back on each other:

- *Isolated individuals decide to stop leading "divided lives."*
- *These people discover each other and form groups for mutual support.*
- *Empowered by community, they learn to translate "private problems" into public issues.*
- *Alternative rewards emerge to sustain the movement's vision, which may force the conventional reward system to change. (Palmer, 1992)⁸⁶*

This essay is a contribution to building collective intentionality directed towards a more connected, more strategic, and more integral process of creation of (more) higher education study programs inspired by integral and likeminded approaches, in the European higher education area and beyond. The overall suggestion is to question the recurrent focus on two organisational levels of strikingly little overall impact anytime soon: the creation of alternative higher education institutions and the transformation of the mainstream higher education system on the institutional level, and the introduction of ILA-based content on the course level. Without denying the value of successful attempts on these levels I am advocating a strategy concentrating on the crucial level of higher education study programs delivering degrees compatible with a broader labour. A strategic corridor was devised along developmental layers with each layer having its own value and autonomous functioning and additional layers adding further value. I tried to make plausible that much more higher education study programs based on integral and likeminded approaches could and should be created than can be observed so far given that the

⁸⁶ Parker Palmer abandoned his academic career he started with a PhD in sociology from Berkeley to become a freelance writer, activist and teacher. Many of his books were widely and enthusiastically received despite or because of the fact that their spirit runs counter dominant structures and practices of (higher) education. He became a Senior Associate of the American Association of Higher Education and a Senior Advisor to the Fetzer Institute. In 1998 a national survey of 10,000 administrators and faculty, named Palmer as one of the thirty “most influential senior leaders” in higher education and one of the ten key “agenda-setters.” In 2003, the American College Personnel Association named Palmer a “Diamond Honoree” for outstanding contributions to the field of student affairs. He received 10 honorary doctorates (source: Wikipedia).

necessary conditions and resources are already available, albeit in a largely distributed and kaleidoscopic manner. In order to actually move along the developmental strategic corridor I have been stressing the crucial role of emergent knotworking as a practice of decentered awareness and coordination enabling the realization of collective intentionality in loosely coupled organisational settings.

On the one hand I tried to show that the contemporary European situation opens up fresh opportunities for advancing the cause of tertiary study programs inspired by integral and likeminded approaches. This situation is created by i) the global crises, ii) the Bologna process, iii) new European funding programs, iv) the diversity of national higher education laws and systems, and most of all of v) the development strategies of the myriads of higher education institutions operating under increasingly competitive conditions, conditions which are imposing the requirement on them to become truly distinctive and original. On the other hand I pointed at two types of obstacles which are preventing these opportunities from being seized to make higher education study programs inspired by integral and likeminded approaches a reality. The first type is structurally inscribed in higher education as it has evolved over the last century or more regarding its disciplinary lineages, its specialization bias, and the dogmatic prejudices of scientism. The second type is due to incoherencies in the various communities developing integral and likeminded approaches, especially the lack of interconnectedness, of common identity, and self-transcendence of integral and likeminded streams on the one hand, and of professional levels of complex strategic thinking, organisational development, and management practice on the other hand.

I have sketched possible paths to overcome these obstacles and envisioned the dawn of a new phase of higher education on the basis of interconnected programs espousing integral and likeminded approaches and overlaying existing higher education institutions and their traditional programs. This web of programs could be cultivated by several transnational consortia linked together by an emergent knotworked coordination which can later formalise as the need arises. My main contention in this essay is that only such a flexible and further expanding offer will respond to the vocation and uniqueness of students, teachers and staff already inspired by integral and likeminded approaches and by a concern for the contemporary transformations of self, nature and society. I tried to show how these inspirations can be expressed by fully embracing what is, i.e. taking realistically into account the institutional inertia and immune defence reactions of higher education systems and institutions as they stand today on the basis of their plurisecular heritage and the contemporary zeitgeist.

I argued that in this process integral and likeminded approaches shouldn't limit themselves to add new content to existing study programs, but to invent different containers and processes true to their general principles and to the versions of andragogy they are bringing about. I have discussed how more integral ways to constitute learning communities on the basis of ethical and personal commitments could work and be adequately propelled through integral andragogies and integral approaches to organisational development. A particular concern was to show how these three major views of, or gateways to one single complex individual-collective subjective-objective transcultural and transdisciplinary process of learning, development and self-transformation could cohere and co-evolve.

As a matter of fact it can be observed that today there are vanguard study programs in which many of the innovative features mentioned in this essay are already implemented and practiced. However, they do not generally explicitly espouse an integral or likeminded approach nor do they convey respective content. At the same time there are other study programs conveying content related to integral and likeminded approaches but which do not necessarily yet put a more fully-fledged integral andragogy and integral organisation into practice. This observation might stimulate the desire to create coherence between community, curriculum and organisation in the spirit of integral and likeminded approaches. The vision I put forward is that the power and attraction of higher levels of coherence as usual between interacting persons, approaches to learning, organisational frameworks and societal needs can turn specifically designed and nurtured higher education study programs into inspiring, evolving centres of a “contaminating” transformative power for individuals, groups and larger collectives. I made clear that this requires to simultaneously depart from, transcend and overlay the given mindsets, infrastructures, rules and practices of (post)modern higher education.

The still largely implicit and outwardly fractured field from which this essay emerged calls for other contributions, responses, corrections and critiques, for alternative and complementary expressions, for new initiatives, for follow-ups, and above all, for action! It calls for knotworking between already existing initiatives, most of which are emergent and still invisible but for the most initiated of all those students, teachers, researchers, practitioners and policy makers already inspired by integral or likeminded approaches, or ready to become inspired. The call comes from nowhere in particular but it is there, it is undeniable, and the specific direction, expression and wording chosen in this essay shouldn't hide that what is to be said and to be done is much more than what can be expressed or appropriately foreshadowed at this stage. It is sufficient, though, to amplify the early signs of the emergence of a movement which translates the “private problems” of isolated students and academic teachers who are inspired by integral and likeminded approaches and who are stopping to live “fragmented lives” into “public issues” and into andragogical and organisational innovation in higher education and society.

This revolution —intellectual, institutional and cultural— if it ever comes about, would be comparable in its long-term impact to that of the Renaissance, the scientific revolution, or the Enlightenment. The outcome would be traditions and institutions of learning rationally designed to help us acquire wisdom. There are a few scattered signs that this intellectual revolution, from knowledge to wisdom, is already under way. It will need, however, much wider cooperative support—from scientists, scholars, students, research councils, university administrators, vice chancellors, teachers, the media and the general public— if it is to become anything more than what it is at present, a fragmentary and often impotent movement of protest and opposition, often at odds with itself, exercising little influence on the main body of academic work. I can hardly imagine any more important work for anyone associated with academia than, in teaching, learning and research, to help promote this revolution. (Maxwell, 2007, p. 113)

References

- Ackoff, R. L. (1989). From data to wisdom. *Journal of Applied Systems Analysis*, 16, 3-9.
- Ashby, W. R. (1958). Requisite variety and its implications for the control of complex systems. *Cybernetica*, 1(2), 83-99.
- Aviram, A. (1992a). The humanist conception of the university: a framework for post-modern higher education. *European Journal of Education*, 27(4), 397-414.
- Aviram, A. (1992b). Non-lococentric education. *Educational Review*, 44(1), 3-17.
- Awbrey, S. M., & Scott, D. K. (n.d.). Creating integrative universities for the twenty-first century. Retrieved October 26, 2009 from <http://www.umass.edu/pastchancellors/scott/papers/creatingU.html>
- Awbrey, S. M., & Scott, D. K. (n.d.). Knowledge into wisdom: unveiling inherent values and beliefs to construct a wise university. Retrieved October 26, 2009 from <http://www.umass.edu/pastchancellors/scott/papers/knowWisdom.html>
- Barnett, R. (2000). *Realizing the university in an age of supercomplexity*. Buckingham: Society for Research into Higher Education & Open University Press.
- Becher, T., & Trowler, P. (2001). *Academic tribes and territories: intellectual enquiry and the cultures of disciplines* (2nd ed.). Buckingham: Society for Research Into Higher Education and Open University Press.
- Benedikter, R. (2006). *Postmodern spirituality: how to find a rational alternative to the global turn to religion; educational dimensions, developments and perspectives*. PhD Dissertation. University of Innsbruck.
- Bhaskar, R. (2002). *Reflections on meta-reality: transcendence, emancipation and everyday life*. New Delhi: Sage.
- Blasi, P. (2006). The European university: towards a wisdom-based society. *Higher Education in Europe*, 31(4), 403-407.
- Bohm, D. (1996). *On Dialogue*. London: Routledge.
- Boyer, E. L. (1994). Scholarship reconsidered: priorities for a new century. In G. Rigby (Ed.), *Universities in the twenty-first century*. London: National Commission on Education.
- Boyer, E. L. (1996). The scholarship of engagement. *Bulletin of the American Academy of Arts and Sciences*, 49(7), 18-33.
- Brockbank, A., & McGill, I. (2007). *Facilitating reflective learning in higher education* (2nd ed.). Berkshire: Open University Press.
- Brown, L. R. (2009). *Plan B 4.0: mobilizing to save civilization*. New York: Norton.
- Butin, D. W. (2005). *Service-learning in higher education: critical issues and directions*. Basingstoke: Palgrave Macmillan.
- Dallmayr, F. (2010). *Integral pluralism: beyond culture wars*. The University Press of Kentucky.
- Dallmayr, F. (2003). *Dialogue among civilizations: some exemplary voices*. Palgrave Macmillan.
- Diamond, J. (2005). *Collapse: how societies choose to fail or succeed*. New York: Penguin.
- Duchastel, P., & Molz, M. (2006). Virtual settings: E-learning as creating context. In A. D. Figueiredo & A. P. Afonso (Eds.), *Managing learning in virtual settings: The role of context* (pp. 24-39). Hershey, PA: Idea Group.
- Endenburg, G. (1998). *Sociocracy: the organization of decision-making*. Delft: Eburon.
- Engeström, Y. (2005). Knotworking to create collaborative intentionality capital in fluid organizational fields. *Advances in Interdisciplinary Studies of Work Teams*, 11, 307-336.

- Fallows, S., & Steven, C. (Eds.). (2000). *Integrating key skills in higher education*. London: Kogan Page.
- Ford, M. P. (2006). *Beyond the modern university: toward a constructive postmodern university*. Charlotte, NC: Information Age Publisher.
- Gabelnick, F. G. (1990). *Learning communities*. San Francisco, CA: Jossey-Bass.
- Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: framework, principles, and guidelines*. San Francisco, CA: Jossey-Bass.
- Garrod, N., & MacFarlane, T. (2007). Scoping the duals: the structural challenges of combining further and higher education in post-compulsory institutions. *Higher Education Quarterly*, 61(4), 578-596.
- Gebser, J. (1985). *The ever-present origin*. Athens: Ohio University Press.
- Gidley, J. (2007). The evolution of consciousness as a planetary imperative: An integration of integral views. *Integral Review*, 5, 4-226.
- Gidley, J. M. (forthcoming). An other view of integral futures: De/reconstructing the IF brand. *Futures*. doi: 10.1016/j.futures.2009.09.005.
- Giri, A. K. (2006). Cosmopolitanism and beyond: towards a multiverse of transformations. *Development and Change*, 37(6), 1277-1292.
- Glisczinski, D. J. (2007). Transformative higher education: a meaningful degree of understanding. *Journal of Transformative Education*, 5(4), 317-328.
- Graves, N. (Ed.). (1994). *Learner managed learning: practice, theory and policy*. Milton Park: Routledge.
- Harrison, R. (2000). Learner managed learning: managing to learn or learning to manage? *International Journal of Lifelong Education*, 19(4), 312.
- Harvey, L., & Knight, P. T. (1996). *Transforming higher education*. Buckingham: Society for Research Into Higher Education and Open University Press.
- Heron, J. (1996). *Co-operative inquiry: research into the human condition*. London: Sage.
- Hess, C., & Ostrom, E. (Eds.). (2006). *Understanding knowledge as a commons: from theory to practice*. Cambridge, MA: MIT Press.
- Horn, K. P., & Brick, R. (2005). *Invisible dynamics. Systemic constellations in organisations and in business*. Heidelberg: Carl Auer.
- Inayatullah, S., & Gidley, J. (Eds.). (2000). *The university in transformation: global perspectives on the futures of the university*. Westport, CT: Bergin & Garvey.
- Kasl, E. (2001). Groups that learn and how they do it. In I. Falk (Ed.), *Learning to manage change. Developing regional communities for a local-global millenium* (pp. 91-99). Kensington Park, Australia: National Centre for Vocational Education Research and University of Tasmania.
- Kehm, B. (2001). The challenge of lifelong learning for higher education. *International Higher Education*, 22, 5-7.
- Kenny, R. M. (2008). The whole is greater: reflective practice, human development and fields of consciousness and collaborative creativity. *World Futures: Journal of General Evolution*, 64(8), 590-630.
- Kezar, A. J. (Ed.). (2005). *Organizational learning in higher education*. San Francisco, CA: Jossey-Bass.
- Kirschner, P. A., & Valcke, M. M. A. (1994). From supply driven to demand driven education: new conceptions and the role of information technology therein. *Computers in Human Service*, 10(4), 31-53.

- Kofman, F., & Senge, P. (2001). Communities of commitment: the heart of the learning organization. Retrieved October 26, 2009 from http://www.axialent.com/uploaded/papers_articles/documentos/Communities%20of%20Commitment.%20The%20Heart%20of%20Learning%20Organizations.pdf
- Laszlo, E. (2001). *Macrosift: navigating the transformation to a sustainable world* (1st ed.). San Francisco, CA: Berrett - Koehler.
- Laszlo, E., & Seidel, P. (2006). *Global survival: the challenge and its implications for thinking and acting*. SelectBooks.
- Lessem, R., & Schieffer, A. (2008). *Integral research. A global approach towards social science research leading to social innovation*. BoD.
- Maxwell, N. (2007). From knowledge to wisdom: the need for an academic revolution. *London Review of Education*, 5, 97-115.
- McNay, I. (Ed.). (2000). *Higher education and its communities*. Buckingham: Society for Research Into Higher Education and Open University Press.
- Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. B. (1974). *The limits to growth: a report for the Club of Rome's project on the predicament of mankind*. New York: Universe Books.
- Meadows, D. H., Randers, J., & Meadows, D. L. (2004). *The limits to growth: the 30-year update*. White River Junction, VT: Chelsea Green.
- Meyer, P., Sporer, T., & Metscher, J. (2009). e³-Portfolio – supporting and assessing project-based learning in higher education via e-portfolios. Presented at the Fourth European Conference on Technology-Enhanced Learning.
- Mindell, A. (1995). *Sitting in the fire: large group transformation using conflict and diversity* (1st ed.). Portland, OR: Lao Tse Press.
- Mindell, A., & Mindell, A. (2001). *Riding the horse backwards: process work in theory and practice*. Portland, OR: Lao Tse Press.
- Molz, M. (2003). One goal, two sites, multiple perspectives: extracting the potential of diverse settings through project-based blended learning. In *Proceedings of the 5th International Conference on New Educational Environments* (pp. 77-82). Lucerne.
- Molz, M. (2010). Contemporary integral education research: A transnational and transparadigmatic overview. In S. Esbjörn-Hargens, J. Reams, & O. Gunnlaugson (Eds.), *Integral education. Exploring multiple perspectives in the classroom* (forthcoming). Albany, NY: SUNY Press.
- Molz, M., & Bauchet, G. (2005). Au coeur de l'éducation interculturelle - au-delà de l'éducation interculturelle. Vers une approche pédagogique intégrale. In F. Baasner (Ed.), *Gérer la diversité culturelle* (pp. 175-182). Frankfurt: Peter Lang.
- Molz, M., & Bauchet, G. (2006). Transnational - transdisziplinär - transmedial. Ein Analyseraster für Integrationsstufen im Hochschulbereich. In J. Breugnot & M. Molz (Eds.), *Europa konkret! Grenzräume als Chance für Bildungsinnovationen?* (pp. 227 - 260). Landau: Knecht.
- Molz, M., & Gidley, J., (2008). A transversal dialogue on integral education and planetary consciousness: Markus Molz speaks with Jennifer Gidley. *Integral Review*, 4(1), pp. 47-70.
- Molz, M., & Edwards, M. G. (2010). Crossing boundaries, stimulating creativity: the horizon of integral meta-studies. In A. K. Giri (Ed.), *Pathways of creative research: towards a festival of dialogues*. New Delhi: Shipra.

- Moon, J. (2004). *A handbook of reflective and experiential learning: theory and practice*. London: RoutledgeFalmer.
- Morin, E. (2008). *La méthode*. Paris: Seuil.
- Morin, E. (1999a). *Relier les connaissances : le défi du XXème siècle*. Paris: Seuil.
- Morin, E. (1999b). *Seven complex lessons in education for the future*. Paris: Unesco. Retrieved October 26, 2009 from <http://unesdoc.unesco.org/images/0011/001177/117740eo.pdf>
- Morin, E., Ciurana, E., & Motta, R. (2003). *Eduquer pour l'ère planétaire : La pensée complexe comme Méthode d'apprentissage dans l'erreur et l'incertitude humaines*. Paris: Balland.
- O'Connor, M. A. (2002). Transformative learning and new paradigm scholarship. In E. O'Sullivan, A. Morrell, & M. A. O'Connor (Eds.), *Expanding the boundaries of transformative learning. Essays on theory and practice* (pp. 1-12). New York: Palgrave Macmillan.
- O'Sullivan, E. (2002). The project and vision of integral transformative education. In E. O'Sullivan, A. Morrell, & M. A. O'Connor (Eds.), *Expanding the boundaries of transformative learning. Essays on theory and practice* (pp. 1-12). New York: Palgrave Macmillan.
- Ottewill, R. (2002). Student self-managed learning - time for action. *On the Horizon*, 10(2), 13 - 14.
- Palmer, P. J. (1992). Divided no more: A movement approach to educational reform. *Change*, 24(2), 10-17.
- Poerksen, U. (1995). *Plastic words: the tyranny of a modular language*. University Park, PA: Pennsylvania State University Press.
- Reason, P., & Torbert, W. R. (2001). The action turn: toward a transformational social science. *Concepts and Transformation*, 6(1), 1-37.
- Rist, G. (2002). *The history of development: from Western origins to global faith*. London: Zed Books.
- Rockström, J., Steffen, W., Noone, K., Persson, A., Chapin, S. F., Lambin, E., et al. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society*, 14(2), Art. 32, 1-33.
- Rowland, S. (2002). Overcoming fragmentation in professional life. *Higher education quarterly*, 56, 52-64.
- Scharmer, C. O. (2007). *Theory U: leading from the future as it emerges*. Cambridge, MA: The Society for Organizational Learning.
- Schön, D. A. (1983). *The reflective practitioner*. New York: Basic Books.
- Schugurensky, D. (2002). Transformative learning and transformative politics: the pedagogical dimension of participatory democracy and social action. In E. O'Sullivan, A. Morrell, & M. A. O'Connor (Eds.), *Expanding the boundaries of transformative learning. Essays on theory and practice* (pp. 59-93). New York: Palgrave Macmillan.
- Schunk, D. H., & Zimmerman, B. J. (1998). *Self-regulated learning: from teaching to self-reflective practice*. New York: The Guilford Press.
- Scott, P. (2000). Globalisation and higher education: challenges for the 21st century. *Journal of Studies in International Education*, 4(1), 3-10.
- Senge, P. M., Scharmer, C. O., Jaworski, J., & Flowers, B. S. (2004). *Presence: human purpose and the field of the future*. Cambridge, MA: Society for Organizational Learning.

- Sgouropoulou, C., & Skiadelli, M. (2008). Reusable project-based learning blocks for higher education. Presented at the European University Information System Organisation (EUNIS) Vision for IT in Higher Education Congress.
- Shneiderman, B. (1998). Relate-create-donate: an educational philosophy for the cybergeneration. *Computers & Education*, 31(1), 25-39.
- Standish, P. (2000). The spirit of the university and the education of the spirit. In F. Crawley, P. Smeyers, & P. Standish (Eds.), *Universities remembering Europe: nations, culture and higher education*. Oxford, UK: Berghahn Books.
- Tanaka, G. K. (2002). Higher education's self-reflexive turn: toward an intercultural theory of student development. *The Journal of Higher Education*, 73(2), 263-296.
- Taylor, R. K. S., Barr, J., & Steele, T. (2002). *For a radical higher education: after postmodernism*. Buckingham: Society for Research in Higher Education and Open University Press.
- Thorley, L., & Gregory, R. D. (Eds.). (1994). *Using group-based learning in higher education*. London: Routledge.
- Ven, A. H. V. D. (2007). *Engaged scholarship: a guide for organizational and social research*. Oxford, UK: Oxford University Press.
- Visser, J. (2001). Integrity, completeness and comprehensiveness of the learning environment: meeting the basic needs for all throughout life. In D. Aspin, M. Hatton, & Y. Sawano (Eds.), *International handbook of lifelong learning* (Vol. 2, pp. 447-472). Dordrecht: Kluwer.
- Weaver, M. (2008). *Transformative learning support models in higher education: educating the whole student*. London: Facet Publishing.
- Wilcox, S. (1996). Fostering self-directed learning in the university setting. *Studies in Higher Education*, 21(2), 165.
- Wilson, B., & Ryder, M. (1996). Dynamic learning communities: an alternative to designed instructional systems. In *Proceedings of Selected Research and Development Presentations at the 18th National Convention of the Association for Educational Communications Technology*. Retrieved October 26, 2009 from http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/14/a1/4c.pdf
- Wolf, K. D. (2001). Internet based learning communities - moving from patchwork environments to ubiquitous learning infrastructures. In S. Dijkstra, D. Jonassen, & D. Sembill (Eds.), *Multimedia learning. Results and perspectives* (pp. 189-223). Frankfurt: Lang.

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Appendix

The following tables reflecting aspects of the long-term evolution of Western higher education (12th-21st century) are focused on prototypes and tuned to the points made in this essay. It must be noted that they are truncated and warped: within-period homogeneity is grossly exaggerated, i.e. national traditions and differences between HEIs are not considered, the place of the recent and probably short postmodern transition period is likely to be overstated by providing it with a separate column whereas the late medieval/Renaissance transition period has been entirely omitted because it doesn't add much to the argumentation in this essay.

Table 1: Persons / roles involved in Western higher education across eras.

	Early Higher Education	Medieval Higher Education	Modern Higher Education	Post-modern Higher Education	Integral Higher Education (scenario)
Students	Only (young, even very young) male students Socioeconomic and national background of no particular importance to access any university but self-selection of students because of the high fees (some scholarships were provided according to local opportunities) Conditions for admission: "mannered lifestyle," integration in one of the "nationes" (student communities) and one of the scholas (community around one teacher) Admission possible at any time Cross-border trajectories were easily possible	Transition from elite to mass higher education, but students from lower social class background under-represented despite the introduction of national scholarship systems considering socioeconomic criteria Female students catching up to parity but underrepresented on the doctoral level until today Admission upon formal application based on high school certificate or prior degree + admission test (in some programs and countries) Majority of students study one discipline in one university in one country Rather homogeneous student groups regarding nationality	Full mass higher education with some diversity and equal opportunity Lifelong learning becomes important Many more non-traditional students (practitioners returning to higher education etc.) Intake upon individual application according to program-based specifications Cross-disciplinary and cross-border trajectories become more frequent	Cross-boundary trajectories are required (across disciplines, cultures, occupations, theory-practice) Diversity sensitivity (non-dogmatic attempt to roughly balance within student groups male and female students with different social class background, students from different cultures, students with different levels of professional experience etc.) For individual admission balanced combination of criteria and combination of approaches Introduction of collective applications	If some continue to have the formal status as students, some as permanent or guest teachers, or as support

Teachers	<p>Qualified through degree</p> <p>Hired by students (Bologna type) or by religious (Paris type) or royal authorities (Cambridge type)</p> <p>Teaching in different places was common</p> <p>Academic teachers were a rare species</p>	<p>Teachers are professors or those who are on the way to become a professor</p> <p>Professors are hired by a higher education institution on a permanent position and mostly teaching at this university</p> <p>There are many academic teachers</p>	<p>Permanent teachers hired by the higher education institution + guest teachers hired by the study programs</p> <p>Teachers teaching in different programs in different HEIs become more frequent</p> <p>There are great many academic teachers</p>	<p>All possible options combined according to arising needs and pragmatic possibilities</p> <p>Non-scholars are invited to the learning community (like artists, spiritual leaders, social activists, policy makers and other practitioners)</p>	<p>staff, all are actual students and teachers of other students and teachers. It is recognized that each member of the learning community has a specific profile of expertise and levels of development across all domains considered together</p>
Support Staff	<p>In the beginning almost none, later scribes etc., and caretakers, cooks etc. for running the colleges (which were just student residencies in the beginning)</p>	<p>University administration, secretaries, librarians, caretakers, cleaners ...</p>	<p>Those of the modern university + IT & public relations specialists + student counselors & study program coordinators</p>	<p>Almost no additional support staff required compared to post-modern higher education, only coordinators of the network of consortia and programs</p>	

Table 2. Approaches to teaching and learning in Western higher education across eras.

	Early Medieval Higher Education	Modern Higher Education	Post-modern Higher Education	Integral Higher Education (scenario)	
Curriculum	<p>Fixed canonical curriculum centered on books and comments</p> <p>Same studium generale for all students (trivium - first cycle, quadrivium - second cycle)</p> <p>3 different programs on the doctoral level (theology, law, medical studies)</p> <p>Long studies</p>	<p>Centered on disciplines and disciplinary knowledge</p> <p>Initial choice among disciplines (or professional programs)</p> <p>Few choices within disciplinary curriculum</p>	<p>Modular curriculum centered on competencies</p> <p>More choices across programs, higher education institutions, and countries</p> <p>Possibility to develop a unique profile</p> <p>Shorter studies</p>	<p>Centered on transformative projects informed by ILAs</p> <p>Intertwined pathways of learning on the individual, group & community level</p> <p>Great many choices (refocused according to vocation and societal needs during the macrosift)</p> <p>Students as co-designers of their curriculum seizing the opportunity to cultivate and develop their uniqueness</p>	<p>Tight and continuous integration of curriculum-planning,</p>

Classes	Class with one main teacher (= schola) Classes are small Lectures, repetitions, disputations	Many classes with different teachers Classes are larger Mostly lectures, tutorials, seminars	Many classes with many different teachers Mix between national and international students Various types of classes and other learning activities	Project-based groups of students supported by one major facilitator learning together and individually according to negotiated pathways (attending classes or inviting teachers fitting to their pathway)	teaching/ learning, research, assessment, practice and career development in multi-stakeholder collaborative learning processes
Pedagogical Approach	Uniform scholastic method Traditional tight interpersonal disciple-master relationship Mostly theoretical, largely separated from practice outside the university	Focus on conveying subdisciplinary content Mostly theoretical, in the branches preparing for the professions some contact with practice for advanced students (but often disconnected from the theoretical training)	Varied but non-coordinated pedagogical approaches and types of competencies actually developed Sometimes some reconnection between theory and practice (through fieldtrips, extended internships, service learning etc.)	Meta-pedagogical approach merging transformative, project-based, collaborative, blended, service learning, with all other pedagogical approaches according to arising needs, overall fostering innovation-oriented practice-based research and research-based practice	Continuous improvement and adaptation of the (meta-) pedagogical approach based on educational research, students' actual needs and reflection of collective experiences in the learning communities
Assessment	Disputatio exam) (oral	Assessment of courses (based on presentation, essay or test) Final thesis Final exams (oral or written)	Portfolio Continuous assessment (module-based exams, various assessment methods) Final thesis	Individual portfolio and continuous assessment of (on-going) collective transformation projects through artful combinations of reality checks and self-, peer, expert & external stakeholder assessment	

Table 3: Structural features of Western higher education across eras.

	Early Medieval Higher Education	Modern Higher Education	Post-modern Higher Education	Integral Higher Education (scenario)
Language(s)	Latin	National Languages	National Languages and / or English	Multilingual (diversity-sensitive and adaptive to particular situations)
Infra-structure	Almost no dedicated infrastructure Classes took place flexibly were facilities were available There were only very few copies of books	Brick & mortar campus Library Research labs	Brick & mortar campus and/or virtual campus and access to protected online resources	Using existing brick & mortar and virtual infrastructures, adding own lightweight virtual infrastructures Meetings take place flexibly were facilities are suitable, and aesthetic (face-to-face & online, synchronously & asynchronously)
Organizational Form & Legal Status	“Universitas” as guild-like association of students and teachers based on self-governance in which a substantial role was granted to the students	Public university status depending on the respective ministry of (higher) education or private university status Self-governance of the professoriate with much less rights for the students	Various legal status (public or private university, foundation, company, company or grouping of public utility ...) Managerial governance (regardless legal status) with little influence of teachers & students on central decision making	Flexible, transnational umbrella organisations (e.g. EEIG) Self-governance of learning communities and the community of learning communities based on integral principles (e.g. sociocracy)
Degrees	Degrees were identical & universally recognized in Europe, originally they served only as admission condition for teaching at the university, not for any of the professions	National degrees (which were not directly comparable) in many subject matters Degrees as mandatory entry requirements for professions and occupations	Transnational mutual recognition of degrees Structural harmonization (3-cycle model, ECTS) Diploma supplement Inflation of degrees	Ideally combination/integration of existing and new (integral studies) degrees Integral extension of diploma supplement and competence frameworks

Quality Control	Quality control steered by students (Bologna type) or authorities (other types)	Professoriate's self-control (or none in case self-control fails)	External quality assurance agencies - (re)accreditation based on site visits, institution's and study program's self-evaluation reports and students' course evaluations	Compliance with international quality assurance standards and procedures + continuous participatory quality development process engaging all stakeholders
Funding	Enrolment fees Tuition fees Exam fees Donations	State subsidies Enrolment fees Tuition fees (in some universities and in some countries) Donations/ own assets	Tuition fees State subsidies Competitive third party funds Donations/ own assets	All traditional options + intergenerational contributions from former students

Consciousness in Evolution

Sketch for a New Model – A Speculation

Donald F. Padelford

Abstract: It is hypothesized that hierarchically negentropic systems (defined herein), including organisms, are associated with partially non-local information/probability fields which, a) entail or express interiority, b) engender “entangled learning” with similar negentropic systems, and c) cause otherwise random processes, including mutation in biotic systems, to become somewhat non-random. These effects, which are believed to be driven by quantum interactions, modify those identified with the Modern Evolutionary Synthesis. A series of tenets, or broad organizing principles, related to such systems and their associated fields, are enumerated. An empirical test which could potentially falsify certain aspects of the hypothesis is given.

Key Words: Adaptive mutation, consciousness, directed mutation, entanglement, entropy, evolution, falsification, information / probability fields, interiority, natural philosophy, negentropy, non-locality, non-random, reductionism.

Introduction

2009 marks the 150th anniversary of the publication of Charles Darwin’s *On the Origin of Species*, in which he formulated the proposition, now almost universally accepted among the scientifically literate, that natural selection, in conjunction with heritable variation and resource limitation, is the principal driver of evolution. When, during the early decades of the twentieth century, this proposition was combined with the work of Darwin’s contemporary (albeit unknown to him), Gregor Mendel, the Modern Evolutionary Synthesis (MES, aka neo-Darwinism) was born, and has mostly triumphed ever since. The “nutshell” version of the MES is that evolution is a product of random mutation plus natural selection.

These mutations of course happen in the genes, which are discrete areas of DNA found in every cell in one’s body, and are passed along to the next generation via gametes (egg and sperm cells). Francis Crick was co-discoverer of the spiral nature of the DNA molecule (the famous double helix), and won the Nobel Prize for this in 1962. Sometime during the next decade he showed up at a men’s club my dad belonged to and gave a little speech which started out with the statement, “You are all machines.” Towards the end of his life he expanded this into what he called “the astounding hypothesis:”

You, your joy, your sorrow, your memories, your ambition, your personal identity and your free will are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules. (Crick, 1994, p. 3)

Of course, as a machine, your “free will” is entirely notional.



This is pretty much the state of play in academic biology, with its underlying scaffolding of evolutionary theory, today. Depressing, but if it's true, it's true, and we've just got to live with it. But is it true? The thesis of this paper is that there is another model of evolution which better accounts for the facts at hand, and that, thankfully, is less depressing. One might even go so far as to say it's hopeful. To the neo-Darwinian proposition that evolution consists exclusively of random mutation in gametes plus natural selection, the new model of evolution sketched out here adds, "Except that organisms create information/probability fields (IP fields) which both convey heritable information directly to progeny, and which have the effect of causing otherwise random events, including mutations, to become somewhat non-random." There's a lot more to it than this, but that's a start.

It has become common in conferences convened to look at the Big Questions, such as *What is consciousness?* or *What does science have to say to religion?*, to invite both scientists and philosophers. The scientists provide a "reality check" and the philosophers provide what might be called an "assumption check." In other words, they are trained to ferret out assumptions that people, including scientists, may not know they are making, as well as to draw logical inferences between disparate fields of thought. So I would like to start in this introduction with a little philosophy, namely parts of the philosophy underlying science as it is currently defined and practiced. The remainder of this essay (a) introduces and discusses the tenets and argument supporting the new model of evolution sketched here, (b) suggests the resulting picture, (c) offers my hypothesis, (d) discusses relationships with the work of Kauffman and Thompson, (e) and, with that ground prepared, presents the model.

The most basic assumption underlying orthodox science is that the stuff of the universe is, well, stuff. It may be quarks, or super-strings, or something else, but it is something, some unit of matter and/or energy and/or space-time or something (some thing). This stuff then somehow combined and somewhere around 14 billion years after the Big Bang produced consciousness. The so-called "hard problem" of consciousness studies is *How does it do this?* That it does it, that matter/energy produces "your joy, your sorrow, your memories, your ambition, your personal identity" is not at issue. Whether it's via a "vast assembly of nerve cells" (Crick), or a 40 hertz collapse of quantum waves in the micro-tubules within those nerve cells (Stuart Hameroff) or something else – however it happens, the general idea is that you start with matter/energy and end up with consciousness. To most contemporary researchers this is so obvious that it doesn't rate a second glance. But it is exactly these "doesn't rate a second glance" issues that rate not just a second glance, but a good, hard second, or even third, look. It is exactly these issues that constitute our underlying assumptions and need to be put on the table, since if they are faulty, then everything that follows from them is also faulty, or at least incomplete.

Ken Wilber, an American philosopher, in his lengthy book, "Sex, Ecology, Spirituality," has an amusing example of a "doesn't rate a second glance" from a previous era, a popular "refutation" of Galileo's discovery of the moons of Jupiter:

There are seven windows given to animals in the domicile of the head, through which the air is admitted to the tabernacle of the body, to enlighten, to warm and to nourish it. What are those parts of the microcosm? Two nostrils, two eyes, two ears, and a mouth. So in the heavens, as in the macrocosmos, there are two favorable stars, two unpropitious, two

luminaries, and Mercury undecided and indifferent. From this and many other similarities in nature, such as seven metals, etc., which it were tedious to enumerate, we gather that the number of planets is necessarily seven. (Wilber, 1995, p. 387)

Today we would say that this is kind of crazy, but to our forbearers it was just common sense. It's certainly possible that a few hundred years hence our descendents will look at the universe-as-machine model we have constructed with the same kind of bemused incredulity. In any event for the present I merely want to point out that this basic assumption—the stuff of the universe is stuff—has not been shared by a very long-standing tradition of both Eastern contemplation and Western mysticism, including some prominent practitioners of quantum physics. Within these traditions the basic stuff of the universe is not stuff, but rather consciousness, or mind:

There is no matter as such. All matter originates and exists only by virtue of a force... We must assume behind this force the existence of a conscious and intelligent mind. This mind is the matrix of all matter.

– Max Planck

The universe begins to look more like a great thought than a great machine.

– Sir James Jeans

This tradition, that of Idealism and its cousins, runs counter to our contemporary “common sense” view that the universe is made up of matter (or matter/energy). While it is off the main path of argument here, I would like to note one thing in passing. Namely “Mind creates the universe” is a nearly identical statement to “In the beginning God created heaven and earth.” Especially if God is consciousness.

Also in passing: Any universe we know, or can know, has a knower, an observer in it. Any fully objective universe, one which has no such an observer and therefore is devoid of subjectivity, while it may (or may have) exist (existed) is purely conjectural. And if consciousness is to any extent non-local, to be explained later, then this condition is impossible. Rerunning Descartes' query, *What can we know for absolute certain?*, the contemporary answer, it seems to me, is *Consciousness of stuff exists*. So the universe we know has a conscious observer, and we know that this observer has observer affects via quantum physics (on which more later). Therefore the known universe is, in part, subjective. What we see is partly an effect of our seeing it. And even if that part may be a very small one, it also may, via the “butterfly effect,” leverage up into macroscopic effects of real consequence, or even (as we will touch on later) have calibrated the parameters of the pre Big Bang universe in such a way as to allow organized matter, life, and consciousness, to have come into existence in the first place.

But that's getting way ahead of the story. Returning to our narrative, starting with Galileo, the thrust of science has been to construct a model, a predictive model, of a non-theistic universe, which is to say one devoid of the supernatural and of “magical thinking.” How do things work? And no need for any frig'n ghosts (or Ghost) in the machine either. Which brings us back to the assumption that matter/energy creates consciousness. As a starting point, I want to question that assumption. In particular, I want to explicate a dual approach in which matter/energy affects consciousness, and consciousness affects matter/energy (and without trying to decide which is

the ultimate “top dog”—a largely futile task) in somewhat the same sense that matter can be converted to energy and vice versa. I think that there is plenty of evidence that this dual view better fits the facts. I would even go so far as to say that the way orthodox science has dealt with some inconvenient data is to simply ignore (or suppress) it. Those familiar with the philosopher of science, Thomas Kuhn, will recognize this as a well-worn pattern: if the data do not fit the reigning paradigm, dump data in the river. Those with longer historical memories will recognize that this was also exactly how the (Catholic) Church initially dealt with the early empiricists, albeit the Church admittedly had tools of persuasion that are thankfully unavailable to the reductionist orthodoxy of today.

Any speculation, such as detailed here, about the nature of reality, is by definition a thought experiment. But what kind of thought experiment? Clearly the model espoused here is not a work of science in the modern sense since I am, in part, questioning an assumption of science as it is currently defined (“the stuff of the universe ...”). On the other hand, neither is it a work of philosophy because I will point out at least one place where implications of the model could be tested, and potentially falsified. Falsification is the bedrock of science. If a statement can be found to be potentially wrong via experiment or empirical observation, then it is a scientific statement. If not, not (Popper). It is true, of course, that the concept of falsification cannot itself be falsified, but I won’t pursue that particular conundrum any further here. (This simply shows that empiricism is based on non-empirical assumptions, as is any system of thought.) It may also be true that a strict adherence to falsification is “honored more in the breach than the observance.” If falsifiability is the “gold standard,” then most science is conducted on the silver or bronze standard (with a bit of tin thrown in now and then). Scientists are people. People are known to advance their views through politics, through ridicule of the opposition, through intimidation and the like. None of these less-than-admirable behaviors are foreign to the scientific community. Still, at the end of the day – sometimes in the middle of the day but other times at a minute or two to midnight – the better approximation to truth will out. That is the virtue of science. Unlike philosophy it has a referee, and his name is Falsifiability. On the other hand, to the extent that an assumption is an absolute one, it cannot be disproved, and therefore belongs more to metaphysics than to science (Collingwood as cited in Castell, 1963). This is the case whether that absolute assumption is *The stuff of the universe is stuff* or *The stuff of the universe is the awareness of stuff*. One may fit the facts better, but neither can, strictly speaking, be ruled out (disproved, falsified).

So, if not science (at least in the hardest sense of that term) and not exactly philosophy (since aspects of it are falsifiable), what exactly is it that I am presenting here? I am inclined to hearken back to an earlier term, *natural philosophy*, to classify what I’m up to, albeit certain reviewers have objected to this characterization, preferring the more general term, “integral theory.” A third possible term is speculative science. However characterized, though, the argument remains the same. I chose the term natural philosophy because the tenets enumerated in the model of evolution to be laid out here fall somewhere in the twilight realm of falsification: Certain implications can be tested and potentially proved wrong (if they are wrong). Others can’t be. And unlike the situation that was addressed by the Michelson-Morley Experiment, which, at least in hindsight, definitively ruled out the existence of the “luminiferous ether” through which light was assumed to be transmitted similarly to a wave being transmitted through water, there is unlikely to be a test that definitively rules out the orthodox model or the model presented here

(though the work of Harvard biologist John Cairns, to be explained later, may possibly come close). Rather, new data will tend to better fit either the orthodox model, the model presented here, or some as-yet-unknown third alternative. Let the chips fall where they may.

Tenets of a New Model of Evolution

What follows are twenty tenets, broad organizing principles, of the model. These are the model's bare bones, which I will subsequently flesh out a bit. In reading these one should bear in mind that, per hypothesis, they operate via the information/probability (IP) field effect, mentioned earlier.

1. Evolution is a phenomenon that takes place in hierarchically negentropic systems in general, and in life forms in particular.
2. Hierarchically negentropic systems are negentropic systems made up of, or constituted from, negentropic sub-systems, which themselves are made up of negentropic sub-sub-systems, etc.
3. Hierarchically negentropic systems are characterized by interiority.
4. Interiority is that aspect of hierarchically negentropic systems which, if concentrated sufficiently, results in consciousness.
5. Thus matter does not create consciousness. Rather highly evolved hierarchically negentropic systems (i.e., advanced life forms) manifest consciousness.
6. The tendency of hierarchically negentropic systems to become more negentropic, with more layers of hierarchy over time constitutes evolution as seen from "outside."
7. As seen from "inside," interiority seeks to increase itself, which is to say, to become conscious, or more conscious.
8. Interiority is, to some extent, non-local.
9. In particular similar (or identical) hierarchically negentropic systems share a degree of interiority. This is the view from "inside" such systems.
10. The view from "outside" is that hierarchically negentropic systems probabilistically tend to adopt, or conform to, solutions found or chanced upon by similar systems.
11. The partial non-locality of hierarchically negentropic systems exists in terms of both time and space.
12. The deeper the hierarchy in hierarchically negentropic systems, the more non-locality is evident.

13. Lower levels of the hierarchy in hierarchically negentropic systems have causal effects on higher levels and vice versa.
14. Also, causal effects operate from exterior to interior and interior to exterior.
15. As reductionism only fully recognizes the former effects (lower to higher and exterior to interior), it is wrong, or at least incomplete.
16. Idealism, while not a major force in today's world, makes the opposite mistake.
17. Up-to-down and in-to-out causality are, to some extent, the same thing, since systems with deeper levels of hierarchical negentropy embody greater degrees of interiority.
18. Likewise down-to-up causality is, to some extent, the same thing as out-to-in causality.
19. Taken to its logical end point, the ultimate hierarchically negentropic system would theoretically be totally non-local as to time and space and share an interiority common to all such systems lower in the hierarchy, including all life forms. The overlap between such an ultimate hierarchically negentropic system and what the religiously inclined call "God" is reasonably evident.
20. Because life continues to evolve, such an ultimate hierarchically negentropic system would logically also continue to evolve.

The Argument

Before launching off on an examination of these tenets I should probably state the nature of my argument. What I am attempting to do is to weave together the findings of various researchers such as Robert Jahn, Dean Radin, Rupert Sheldrake, Johnjoe McFadden and others, and apply my synthesis of these findings to the subject of evolution. Except where I express reservations, I accept their findings as valid. Those readers who want to make their own determination about such validity will need to study the work of these researchers as I don't spend any time in persuasion or in countering critics, who are definitely out there. Those readers who have read and are unpersuaded by the work of these researchers are likewise unlikely to be persuaded by my analysis.

Some thinkers who, either by implication or explicitly, do not generally accept the finding of the above researchers, and to whom I situate the theory here in contrast, include the philosophers Evan Thompson, John Searle, and Dan Dennett, as well as the scientists Stuart Kauffman and Richard Dawkins. My disagreement with these gentlemen varies from partial to near-total as the narrative will disclose. The essay includes a section detailing my divergence from Kauffman and Thompson.

I should state that the tenets listed here exhibit considerable overlap with those of Ken Wilber (1995) in his *Sex, Ecology, Spirituality*, mentioned earlier (hereinafter "SES"), which in their turn exhibit much overlap with similar "canons" laid out by Arthur Koestler (1968) in his book,

The Ghost in the Machine. One major difference is that Wilber's unit of analysis is the "holon," which, following Koestler who coined the term, he defines as anything which is simultaneously a whole and a part of a whole. So for instance a word is a whole thing, which is made up of phonemes (or letters), sub-holons, and which is, or can be, part of sentences, super-holons. However, words don't resist entropy (explained below). The term I have coined, "hierarchically negentropic systems" would be equivalent to Wilber's physical holons (except to say that they are only physical would be misleading, as I trust will become evident). The biologist, Rupert Sheldrake, also uses the word holon in his work, but confines it to physical holons. So Sheldrake's holon is largely equivalent to my hierarchically negentropic system.

Discussion

Now let's take the tenets one or two at a time.

1. *Evolution is a phenomenon that takes place in hierarchically negentropic systems in general, and in life forms in particular.*
2. *Hierarchically negentropic systems are negentropic systems made up of, or constituted from, negentropic sub-systems, which themselves are made up of negentropic sub-sub-systems, etc.*

The subject is evolution both in biotic (living) and in pre-biotic systems. (To some extent humanity could be considered to have created a "post-biotic" world, a major theme of Wilber's work, but not of this paper.) An example of the former is a cell. An example of the latter is a molecule. These systems are "negentropic" meaning that they resist entropy. Entropy is, roughly speaking, disorder. An example is a sugar cube put in a glass of water. Over time, the sugar dissolves into the water. But the opposite process is not seen: a glass of sugar-water will never spontaneously form a sugar cube. (Another example is your kid's bedroom after he or she has had a "play date" with a friend.) Entropy is an expression of the second law of thermodynamics, which states that the universe is inexorably "winding down," leading in time to its eventual "heat death." Fun guys, scientists.

Negentropy is the opposite process. It is the "winding up" of certain systems. For instance, a whirlpool may be considered negentropic in that it spontaneously expresses order. No claim is made here that negentropy matches or exceeds entropy on the macro scale. Generally scientists believe that it is the other way around, that whatever negentropy may occur is more than made up for by increased entropy elsewhere, with the result that total entropy always increases. I am not challenging that belief, and I don't express an opinion, one way or the other, as to its general validity. I would note in passing that it is incompatible with certain cosmologies, such as that in which the universe has no beginning or end, but this is not a paper on cosmology.

(Note to physicists re use of the term entropy, and thus negentropy. In the sense used here a royal straight flush is more negentropic than a hand with two of a kind. As I understand it, this is a function of information entropy vs. its thermodynamic cousin. Obviously the physical temperature of the cards is irrelevant to this use of the term. So, yes, I am more or less equating entropy with disorder, as do many (but not all) the researchers I cite, although sometimes their

use appears to be ambiguous. If you are disapprobative of this use of the term, please feel free to insert the word *disorder* for *entropy*. The main thrust of the argument will not be materially altered thereby.)

However, the example I just gave, that of a whirlpool, is not the kind of negentropic system I am talking about here. What I am talking about is a negentropic system that is made up of negentropic sub-systems, which themselves are made up of negentropic sub-sub-systems, etc (with an undefined lower boundary). For this reason I use the term *hierarchically negentropic systems*. For example a molecule is made up of atoms, which are made up of sub-atomic particles (neutrons, protons, electrons), which are made up of more basic components of matter (quarks or whatever), until, perhaps, we end up with super-strings. Which is as far as we've gotten so far. (Actually further, since no one knows whether super-strings even exist.) The claim, which I believe is non-controversial, is that these entities (e.g., molecules or atoms) tend to maintain their order, their negentropy. (Uranium spontaneously decays, which could be characterized as maintaining its negentropy less well than other, more stable, elements.)

The further claim, also believed to be relatively non-controversial, at least within the scientifically-informed world, is that evolution is not limited to the realm of what are generally seen as living systems, but also takes place in the pre-biotic realm as well. Since nearly everyone who accepts the scientific worldview agrees that life emerged from the pre-biotic, this is almost by definition true (although the mechanisms of evolution could differ). Also it is difficult or impossible to say exactly where living processes end and non-living process start. Is a virus alive? Hard to say. Another perspective on this is that following the Big Bang only very simple particles existed, then the first and simplest atoms, hydrogen and helium, and then, over time, more complex atoms formed in the center of large stars, until still later molecules were created from those atoms. The general thrust here is that, whatever the level of total entropy in the universe, there is at least a sub-section of it that is going in the opposite direction, towards greater complexity and greater negentropy. The hierarchical nature of this process, e.g., first atoms then molecules, is also evident. In SES Wilber points out a simple test as to what is higher or lower. If a higher holon were to cease to exist, the lower level holons would continue, but not vice versa. So if, somehow, molecules were wiped out, atoms would remain, but not vice versa. Likewise if humanity were to destroy itself, that would not be the end of life on earth. But if all life on earth were to end, that would also be the end of humanity.

One final thing on these first two tenets. Because what I am describing is *hierarchically* negentropic systems, in the biotic realm I am following the lead of the biologist Johnjoe McFadden, in stating that these are not dissipative systems, which he characterizes as “order from disorder” (McFadden, 2000, p. 136). The example given above of a whirlpool is an example of such a dissipative system, “driven by the random motion of billions of particles.” Rather I am focused on *hierarchically* negentropic systems, “order from order” (Schrödinger’s term in McFadden, p.137). A great deal of the scientific establishment believes that life is exactly a dissipative system. (This is conjoined to the view that “downward causation” is actually “systems causation,” as with the whirlpool example. See Thompson, 2007, p. 426). The claim here is to the contrary since, to repeat, a dissipative system is negentropic but not hierarchically negentropic. Clear?

3. *Hierarchically negentropic systems are characterized by interiority.*
4. *Interiority is that aspect of hierarchically negentropic systems which, if concentrated sufficiently, results in consciousness.*

Here I am departing decisively from scientifically orthodox thinking (assumptions), not to mention “common sense” (but remember Wilber’s example of medieval “common sense” about the correspondence of human orifices with the number of planets). However, common sense is a somewhat selectively applied notion. At a conference on the conflict between (orthodox) science and religion (*Beyond Belief*, 2006, viewable on the web) the assembled chuckled at the story of a petroleum geologist who in his professional capacity obviously understood that the precursor materials for oil deposits were laid down hundreds of millions of years ago, but who in his private life believed that life was put on earth 6,000 years ago. These same assembled did not, however, seem to find any contradiction (or humor) between their idea that, as reductionists, they purportedly have no free will, and their idea that they “should” spread scientific thinking. “Should”? Either your garage door opener works or it doesn’t. You don’t tell it what it “should” do. Should implies choice, and reductionists (sophistic arguments of certain philosophers to the contrary notwithstanding) don’t believe that choice, and free will, exist. Like the geologist, they believe in contradictory propositions, each of which is “common sense,” at least in their world.

Tenet 4 is, of course, simply a definition tying consciousness to something else, interiority. In both tenets I am saying that as we go from “deeper” hierarchically negentropic (HN) systems, ones with more hierarchical layers, to shallower ones, interiority likewise gets shallower, but, and here is the break, it never totally disappears. (While I haven’t read him, I understand that this mirrors Whitehead.) This may not be too controversial if we limit ourselves to the upper layers of HN systems. Humans are, of course, conscious and even self-conscious. For instance we can contemplate our death or what someone else may think of us, how they’re wrong, and just who do they think they are anyway? Nearly everyone likewise agrees that companion animals such as cats and dogs are also conscious, but of course not in as deep a way. Your dog may loathe (or love) the neighbor dog, but he doesn’t think, *Who does he think he is anyway?*

Exactly how far down the phylogenetic table one wants to ascribe consciousness varies from person to person. Descartes notoriously excluded all non-humans. Most people, no doubt, see mammals as conscious, but what about birds? If birds are conscious, what about insects? *Et cetera*. The point is that one can probably draw the line on consciousness wherever they want, though only a true pan-psychic would believe that a simple molecule has it. (And research indicates that our brains are aware of many things of which we are not conscious, for instance under conditions of so-called “blind sight” – Google it). But as far as “interiority” goes, it’s a lot like life. Just as there is no clear line between “life” and “not life” (is a virus alive?), so there is no clear line between “exhibits interiority” and “doesn’t exhibit interiority.” That’s the claim anyway.

The way I (attempt to) establish this claim, as will become evident below, is that clearly conscious “systems,” such as people or rats, show similar learning, and particularly non-local or entangled learning (to be described later) as clearly non-conscious systems, such as molecules (“clearly” to all but pan-psychists). It is possible, of course, that two different mechanisms that

appear identical, one mechanism for systems with interiority and one for systems without it, are at work. But, borrowing Mr. Achem's Razor (also known as Occam) for a moment, I would assert that one system is preferable to two seemingly identical ones. Especially when, to repeat, finding the line between "has interiority" and "doesn't have interiority" seems as arbitrary as "alive" and "not alive."

Another approach to this issue is to see it in terms of evolutionary selection. Just as detection of light must exist in cells in order for evolution to gradually select for better and better "light detectors," which eventually end up as eyes, so if evolution selects for awareness/consciousness, that is, if it has survival (negentropy) value, then it must exist in the most rudimentary life forms (and even in "dead" matter if evolution extends to the pre-biotic as almost all scientists believe) in order for evolution to work on it.

5. *Thus matter doesn't create consciousness. Rather highly evolved hierarchically negentropic systems (i.e., advanced life forms) manifest consciousness.*

This is a conclusion from the prior two tenets. As stated previously, this conclusion throws the so-called "hard problem" of consciousness studies *How does matter create consciousness?* out the window. Answer: it doesn't. Rather hierarchically negentropic systems and interiority are the same thing seen from two different perspectives, "outside" vs. "inside." (Although, as touched on later, it is conceivable that "artificial interiority" may be achievable in quantum computers, and computers are not hierarchically negentropic systems.)

This does not mean that a pencil, *qua* pencil, has interiority, let alone consciousness. The reason is that a pencil is not a hierarchically negentropic system. In fact it's not even a negentropic system since it doesn't resist entropy. To review: an atom, a cell, a plant, an animal, are all HN systems. So the atoms in the pencil are hierarchically negentropic systems, but the pencil itself is not. How about dead plants or animals? When an animal is first killed, or a plant growing in the ground is cut down, its cells will continue to grow and divide, or at least some of them will. So, for the time being, while the organism is dead, these cells are alive as active HN systems. When the cells die, then their atoms remain hierarchically negentropic system, but the cells themselves do not.

The idea that consciousness is "baked in" to the universe was explored by Paul Davies (2007) in his book, *Cosmic Jackpot*, which is subtitled *Why Our Universe is Just Right for Life*. If any of a number of parameters were just slightly different, a universe that permits life, and therefore consciousness, would never have developed. And others have also made this point:

... the density of the universe at the start ... had to be fixed with an accuracy of around 10^{-60} . That is to say, if one figure after sixty zeros had been different, then the universe would be barren. There would be no life, no consciousness, and no you and me to discuss it. This astonishing precision is analogous to the dexterity of an archer hitting a one-centimeter-square target placed 15 billion light-years away, at the other end of the observable universe!

– *The Quantum and the Lotus*
Matthieu Richard and Trinh Xuan Thuan (2001, p. 41);

also see *Just Six Numbers: The Deep Forces that Shape the Universe*, Martin Rees (1999)

Needless to say, the conventionally religious take this fact as support for their beliefs. For his part, after running through a list of the various possible explanations, Davies ends (albeit somewhat half-heartedly) with the possibility that consciousness itself creates the conditions under which consciousness could arise. In this view consciousness is in some way outside time and acts on or shapes matter to “fix” the parameters so that they are favorable for life, and therefore consciousness, arising. The model presented here is consistent with, but does not require, this cosmology (which I personally like). However one difference between this model and Davies’ view is that he, similarly to Stuart Kauffman, has an “emergent” view of life and consciousness in that he believes, for instance, that the cell is a machine (Davies, 2007, p. 224), whereas I am saying that a cell, or even a molecule, embodies some degree of interiority, no matter how slight, and that machines, not being hierarchically negentropic systems, do not.

6. *The tendency of hierarchically negentropic systems to become more negentropic, with more layers of hierarchy, over time constitutes evolution as seen from “outside.”*
7. *As seen from “inside,” interiority seeks to increase itself, which is to say, to become conscious, or more conscious.*

Tenet 6 is a definition of evolution that, among academics anyway, is a bit archaic, although it represents the layman’s understanding of the term, and it is also pretty much how Darwin (1859/1964, p. 489) saw things: “And as natural selection works solely by and for the good of each being, all corporal and mental endowments will tend to progress towards perfection.” Under neo-Darwinism, though, evolution doesn’t really have a direction. This is because, per the Modern Evolutionary Synthesis (MES), the creative mechanism that produces the “design space” from which natural selection chooses, is randomness in the form of random mutation. And randomness obviously doesn’t have a direction. It is not teleological, which is to say it has no goal. And in the orthodox view, neither does natural selection have a goal. Whatever reproduces itself, reproduces itself. End of story. Thus most academics would say that if, due to varying food supplies, Darwin Finches with stout beaks have more young (because the stout-beaked don’t starve) than the slender-beaked (which do starve), that this is evolution at work. And if in the following years the slender-beaked have more young, taking us back to where we started in the first place, that this is also evolution. Exactly this back and forth process was involved in perhaps the most famous example of “evolution,” that of moths becoming darker, because more difficult to see by their predators, during Victorian England when coal use was at its height and thus surfaces were sooty, and then becoming lighter in subsequent decades as coal burning lessened (or at least became cleaner).

By contrast, the popular view, and the one adopted here, is that when you go from slime mold to monkeys, or, extending things further, from Big Bang to Bach, that’s evolution. And going from light colored moths to dark colored ones and then back again isn’t. In part this is definitional, but the result of this definition is that evolution does have a direction. Namely towards more layers of negentropy, and greater interiority. Of course the simpler negentropic systems (including simpler life forms) don’t all disappear (albeit many go extinct). The

appearance of molecules does not spell the end of atoms. Viruses continue to prosper. And Darwin Finches may merrily vary the shape of their beaks back and forth over time.

In my view, these dual tenets deal more adequately (or less inadequately) with the issue of increasing negentropy or more complexity. The neo-Darwinian view on this is that it's all a matter of natural selection. (I guess if all you've got is a hammer, everything looks like a nail.) But while the process of natural selection may be enough to account for better eyes evolving from worse ones, it's not clear that complexity (not to mention interiority) in itself has any survival value at all. In the event of a full-scale nuclear war, it's reasonably clear that bacteria, unlike people, would survive, as they apparently have as hitch-hikers on moon probes:

Bacteria of the species *Streptococcus mitis* were inadvertently sent to the moon in the unmanned Surveyor III in 1967 and were "rescued" still alive [dormant – dfp] two years later by the crew of Apollo 12 who brought back Surveyor's TV camera. The organism had been subjected to very low pressure [to say the least!] and temperatures of minus 100 degrees Celsius. [= -148 Fahrenheit] (Milton, 1997, p. 217.)

If your only goal in life is to replicate, which is the MES view, then you're probably better off being a bacteria, or even a virus, than a mammal. In contrast, the view here is that a drive to escape entropy is "baked in" to hierarchically negentropic systems, and perhaps the universe itself. In which case it's better to be a mammal.

Tenet 7, interiority seeks to increase itself, of course, is totally beyond the pale as far as orthodox researchers are concerned, but I think it more or less follows from the previous tenets. If there is a "felt sense" of interiority within all hierarchically negentropic systems, then almost by definition, negentropy "feels good" however one might want to interpret or think about the term "feel" if we are talking about, for example, a molecule. Everyone (using that pronoun in the very widest sense) likes to feel good. And one drop of water dripped in the Pacific Ocean creates a wave, even if a very small one, that can go from California to Japan and back again. So you don't have to be a big wave to be a wave (don't have to be an advanced hierarchically negentropic system to have a level of interiority). Of course if there is no interiority in HN systems below some level, which is the emergent view, then we are faced with the "hard problem" of consciousness all over again, except this time we have to figure out how matter/energy creates proto-consciousness, or interiority. At the risk of repeating myself, I simply feel it is simpler, more economical ("achem-onomical") to posit one system as seen from the "inside" and "outside," rather than two totally different ones.

The emergent view is that of, for instance, the philosopher (I would even call him a practitioner of natural philosophy) Daniel Dennett in his book, *Darwin's Dangerous Idea*. Make a machine complex enough, and somehow it acquires consciousness and autonomy: "you can transcend your genes ... to build an almost entirely independent ... locus of meaning on the base your genes have provided" (Dennett, 1995, p. 426). In his view, determinism and autonomy are consistent, which I would call a close cousin to the concept that freedom and slavery are the same thing. I might call Dennett's line of reasoning "magical reductionism." Of course to posit that even a molecule has some kind of "interiority" could also be labeled magical. But I would assert that the "magic" required by not being able to locate a line between "has interiority" and

“doesn’t have interiority” is considerably less than that of imagining the something-from-nothing entailed by a machine creating consciousness. And there is an empirical test (to be explained later) which at least indirectly gets at this question.

8. *Interiority is, to some extent, non-local.*

This tenet is a set up for the next two tenets. By “non-local” I mean what quantum physicists mean by that term. One interpretation of quantum physics is that a particle can be in two places at once. Another interpretation is that “entangled” particles are separate but communicate instantly. In theory if one such particle were here and its “mate” were at the other end of the universe, then if we flipped the one here “up,” the other would instantly flip “down.” (Don’t ask me what “up” and “down” mean in this context, I don’t know.) Of course by the time we got confirmation of this via the fastest speed possible, that of light, we would all be long gone, as would the earth. Also, and this is largely another way of saying the same thing, when a quantum wave function collapses, it does so everywhere, instantaneously. (How this squares with the General Theory of Relativity, under which the concept of simultaneity is obviated, I’m not entirely sure.) And if, for instance, that wave function is associated with a proton, then that proton is “precipitated” from a “super-positional” (quantum) state into a “classical” state. In the way we are used to thinking of chairs, trees and rocks as “real,” it becomes real at that point. Previously, to borrow a term of disparagement and use it for other purposes, it’s a “ghost in the machine” (suggesting, I believe correctly, albeit inadvertently, a correlation between quantum reality and consciousness).

Another demonstration (or aspect) of non-locality is that of so-called psi phenomena, and the most sober scientist in this field is Dean Radin. Formerly a researcher at ATT Bell Labs, Radin has also worked at GTE Laboratories, Princeton University and SRI (formerly Stanford Research Institute), among others. At SRI the client was the clandestine agencies of the US government. Psi includes such phenomena as telepathy (sending information between two individuals absent normal means, basically mind-to-mind interaction), and remote viewing (being able to see or otherwise sense things at a distance by other than normal means). I have concluded from Radin’s work and elsewhere that these phenomena are real. Perhaps the clearest, most scientifically “nailed down” example of psi is provided by the research of Robert Jahn of Princeton University, formerly Dean of the School of Engineering. Over several decades he and his collaborators systematically and scrupulously investigated whether people could influence random number generators (RNG’s, essentially electronic coin flippers) to produce more “heads” than “tails” (ones than zeros), simply by a person’s *intent* to have them do so, without any physical intervention (see, for instance, Radin, 1997, p. 43, and Jahn, 1987). The short answer, is *yes*, people can do this. The effect isn’t large, but it is extremely statistically significant. As much as anything can ever be established by statistics, this phenomenon is established. As Radin has pointed out, calling a baseball player a “power hitter” is a matter of statistics. If you’re batting 300, you’re doing great, but you’re only hitting one in three times at bat.

By the qualifier in this tenet, “to some extent,” I mean that even if, as I believe, these phenomena are real, they are nonetheless weak. (On the other hand it is strong enough for Radin to have created and patented a switch, with which one could, for instance, turn on or off a robot on a distant planet, utilizing the effect.) While the CIA used “psychic spying” for decades (Targ,

2008), it's much better, if possible, to examine a missile launcher in person than to remote view it. Not always possible of course, which is why the CIA employed psychics. (By the way, the program was dismantled after the Cold War and thus was not in place to remotely view alleged "weapons of mass destruction" prior to the invasion of Iraq in 2003.)

9. *In particular similar (or identical) hierarchically negentropic systems share a degree of interiority. This is the view from "inside" such systems.*
10. *The view from "outside" is that hierarchically negentropic systems probabilistically tend to adopt, or conform to, solutions found or chanced upon by similar systems.*

Tenet 10 expresses the findings of Rupert Sheldrake as reported in his books, *A New Science of Life* (1981), and *The Presence of the Past* (1988), and elsewhere. Tenet 9 is my extrapolation, looking at these phenomena (as well as the results of psi phenomena such as telepathy mentioned above) from "inside." I will attempt to show the nature of Sheldrake's findings via a series of examples.

Example one. The New York Times publishes a crossword puzzle every day. If you take two groups of people with equal puzzle-solving expertise and have one group try to solve, say, the Monday puzzle on Monday, and then take the second group and, making sure they weren't exposed to it (the jury sequestration issue), have them try to solve it on the following Saturday, after millions of people around the world have previously worked on it, you will find that the second group does better, gets more right answers in a set amount of time, than the first group. These groups can be widely separated geographically.

Example two. If you take two groups of identical rats with, say, one group in New Zealand and the second group in New York, and you have the first group learn a particular maze, and if, some time later, you set the second group loose on the same task, the second group will learn the maze faster than the first group.

Example three. Scientists sometimes create novel molecules that have never existed before in nature. When they do this, they always have a hard time getting them to crystallize. But once a lab somewhere (let us say New Zealand again) gets the first group of novel molecules to crystallize, then labs elsewhere (say New York) find that it becomes easier.

Two of these examples (people learning a crossword puzzle, rats learning a maze) involve sentient (conscious) hierarchically negentropic systems. One (novel molecules crystallizing) doesn't. But the pattern of shared and "non-local" (or entangled) learning seems to be the same. Thus, following the prior tenets, it seems reasonable to look at this process from both the "inside," which is to say from a standpoint where consciousness, or at least interiority, is involved, and from the "outside," which is to say objectively.

Note: This brings us to an important point and one where at least parts of the model presented here could be tested and possibly falsified.

Let's take the rats in a maze example and set about the following experiment. First, run the same experiment and confirm it with a fresh batch of rats and a new maze. Next build a set of robot rats with the same level of maze-learning ability (and speed) as the real rats and have them learn the same maze. The hypothesis is that a second group of identical robo-rats in another location would not benefit from the non-local learning that is enjoyed by the flesh and blood rats. The hypothesized reason for this hypothesized deficit in the robo-rats is that, since they are not hierarchically negentropic systems as defined earlier, they presumably have no "interiority." However, and this is another important point, note that the novel molecules *do* exhibit this non-local learning. Therefore a possible conclusion is that the molecules, hierarchically negentropic systems after all, exhibit or express interiority. In any event, according to the model, they do.

I should note that other interpretations of the above-hypothesized results are possible. For instance, it is possible that non-local learning and interiority are independent effects of some unknown third factor, and that this factor can cause one effect, for example non-local learning, without causing the other. As Hume famously pointed out, correlation is not tantamount to causality. However, without an experimental protocol to tease out different experimental results in this other interpretation, the two interpretations are for all practical purposes indistinguishable. (This is a good example of an instance in which it is possible to draw a philosophical difference between two views without being able to untangle them from a scientific, or practical, standpoint.)

This projected result of the rats vs. robo-rats experiment has implications for the question of whether conscious machines can be made, and if so, in what ways they might differ from biologically-based conscious systems (organisms). Following Roger Penrose (1989), I don't believe that classical computers, no matter how "smart" (e.g., able to play chess) will ever become conscious. But would robo-rats with quantum (i.e., non-classical) computers for brains suffer the same (presumed) lack of interiority and therefore non-local learning? In my mind that's an open question. If not, then portions of the model presented here would need to be modified, since not even quantum computers (which don't exist except in the most rudimentary form yet) are hierarchically negentropic systems. (If quantum computers did become conscious, then a function we could expect from them would be an ability to affect random number generators via intent a la the Jahn experiments described in tenet 8. However, it is unclear to me how it would be possible to program a computer to express intent. Computer programs are, as Dan Dennett [1995] has said, algorithmic: if this, then do that. Dennett believes that Darwin's genius was that he found a simple algorithm for increasing biological complexity, and that any such algorithm is necessarily transposable to a different medium such as silicon. But how do you program for: If this, then *intend* that? I, at least, have no idea.)

The above examples involve learning, not morphological development. However, while I do not examine it in this essay, Sheldrake devotes a good deal of time on the latter issue in his early books. The orthodox view is that development is controlled by selective switching on and off of genes, whereas Sheldrake's theory involves non-genetic inheritance. Most of the (genetic) work on this subject was conducted subsequent to Sheldrake's initial books. While he doesn't discount the idea that non-local shared learning (my terminology, not his) could have genetic effects, and the implication of his theory is that such effect should exist, in none of his writings of which I am aware does he make the claim that this sort of learning *does* have genetic effects (and he has

emailed me that he does not wish to assert this claim). To this extent his theory (but not, at least in my view, its implications) is compatible with the MES since the neo-Darwinian process, with its random shuffling of genes every generation, could be going on in parallel to the processes identified by him. On the other hand, his views are incompatible with the MES to the extent that per neo-Darwinists non-genetic (learned or directed) inheritance is impermissible (“magical” is the term often used).

By the way, Darwin, who didn’t know about genes and thus didn’t distinguish genetic from non-genetic inheritance, made claims which are strikingly similar to those made by Sheldrake in the realm of morphology: “From the facts alluded to in the first chapter, I think there can be little doubt that use in our domestic animals strengthens and enlarges certain parts, and disuse diminishes them; and that such modifications are inherited” (Darwin, 1859/1964 p. 134). This sentence could be inserted, without modification, into any of Sheldrake’s early books. Of course, neo-Darwinists completely disavow this aspect of their hero’s work. (Not to mention the following: “[A]t some future period, not very distant as measured by centuries, the civilized races of man will almost certainly exterminate and replace throughout the world the savage races” in *The Descent of Man*, Darwin, 1871/2004, p. 201. Oops!) In any event, I agree with Sheldrake that learning may be inherited as shown in the above examples. Furthermore, I hypothesize that the intent (or mental “push”) behind learning sometimes produces heritable genetic effects in biotic systems via influence of the organism’s (posited) information/probability (IP) field. (Obviously these effects are, by definition, non-genetic in pre-biotic systems.)

An example of Sheldrake’s thinking in relation to inherited learning is provided by the following experiment (Sheldrake, 1981, p. 186). Rats (poor rats again) were placed in a flooded cage. There were two gangways for escape, a lighted one that, unfortunately for the rats, produced a shock when chosen, and an unlighted one. Eventually the critters learned to choose the unlighted exit. When fresh rats of the same species were put in the cage, they learned the task more readily than the first rats. So far basically the same as the maze experiment. Not surprisingly, given that prior experiment, the rats’ descendents also learned to find the exit faster than their forbearers. When a genetic explanation for this was formulated, the experiment was changed so that only the offspring of the stupidest rats (who found the exit least successfully) were tested. But even these found the exit faster than earlier generations, seemingly exhibiting shared learning across generations. Thus, in Sheldrake’s view, information was passed from one generation to the next in a non-genetic manner. His explanation is that “morphic fields” (which I would translate as IP fields) are formed and passed along, these fields constituting non-genetic inheritance of the descendents.

While it is slightly off the main thrust of my argument here, I want to note one thing. Per Sheldrake these fields should build up generation upon generation. And, as described earlier, there is evidence of this with, for example, people getting better at IQ tests over time (as self-described debunker of pseudo-science, Michael Shermer, noted in his talk at one of the TED conferences viewable on the web). But there are also counter-examples. After the fall of the Roman Empire, people seemed to lose a whole host of abilities, from perspective drawing to engineering, for a thousand years or more. One possible explanation for this loss is that these abilities were an expression of a more complex hierarchically negentropic system, in normal English, a more advanced civilization. By this tentative hypothesis, Rome had more layers of

hierarchical negentropy than Medieval society, and shared learning was disrupted when that hierarchy became shallower, since the fields were an expression of the deeper negentropic hierarchy. (This would correspond to Wilber's [1995, p. 44] view that holons break down holoarchically, in the reverse order from which they were formed.) Another possible explanation is that the generations-long shock accompanying the collapse of Rome traumatized people so much that they were unable to retain this knowledge. The simplest explanation is that there was just no one around to teach these skills to the next generation. However, in the above experiment, one generation of rats did not teach the exit-finding skills to the next generation. In any event, it's clear that there are instances where cumulative non-local shared learning breaks down.

11. *The partial non-locality of hierarchically negentropic systems exists in terms of both time and space.*
12. *The deeper the hierarchy in hierarchically negentropic systems, the more non-locality is evident.*

Space

Non-locality in terms of space was illustrated with the Sheldrake examples under tenets 9 and 10. Rats in New York learn, non-locally, from their New Zealand or Australian "mates." (Whether this is totally non-local – would rats on the other side of the universe benefit like their New York brethren? – is something about which I don't speculate.)

Time

Non-locality in terms of time mostly concerns "retro-causality" since "forward causality" is normally what we mean by the term. So, to retro-causality. Lynne McTaggart in her book, *The Field*, has a number of examples. Here is one (McTaggart, 2002, p. 170). If you remember back to tenet 8, there was mention of the work of Robert Jahn and the ability of people to influence the output of "heads" or "tails" in random number generators. Now what if the RNG was let run by itself, with no attempt to influence it via intent, and with the results stored on magnetic tape. In this case a "head" could be a click in the right ear when played back, and a "tail" a click in the left. The question is whether a subject in the experiment could go back some days later, play back the tape, and get more "heads" (or "tails") than chance allows. The answer is that people can in fact do this and that therefore some kind of retro-causation appears to exist in this case. (Amit Goswami [2008, p. 170] reports in his *Creative Evolution* that a similar experiment, with similar results, was conducted with the results printed out onto paper as opposed to being recorded onto audio tape). Thus at least people, if not less advanced hierarchically negentropic systems, appear to be able, in some instances and to some extent, to influence the past as well as the future. (Per personal communication with Dean Radin, there is experimental evidence for non-humans affecting RNG's, apparently extending down as far as cockroaches and even plants).

Another example is being laboratory tested with the results not known at the time this paper is written. John Cramer, a physics professor at the University of Washington (Seattle), is testing whether an entangled "wave-acle" (wave/particle) that is forced to act one way or the other (wave or a particle) can force its "mate" to act in the same manner. If that is successful, the next step will be to see whether a wave-acle in the present can affect its mate in the past (Cramer). This will be done by sending one down a short fiber optic cable and another down a long one. If

the experiment succeeds, forcing the one that comes out of the long cable, slightly later, to behave as a particle (or wave) will force its mate, in the slightly distant past, to assume the same form. (Naturally, this experiment is more complex than described here; however, I believe I am giving the gist of it, namely retro-causality by entangled particles.)

The third example references the “double slit” experiment of quantum physics, which is explained under tenet 14 below. The essence of that experiment is that the observation of a quantum particle (wave/particle) affects the character of that wave/particle and that observation of it at time t , can cause the collapse of the wave function associated with the “wave-acle” at time $t-1$, which is to say, in the past.

A fourth example explores whether people sometimes react to a shocking picture before they have seen it. This is termed “presentiment” and Dean Radin explores this issue in his books, *The Conscious Universe* (1997) and *Entangled Minds* (2006). A randomly chosen picture, either of a calm nature (nature scenes, cheerful people) or of a shocking nature (murder victims, erotica), is shown to a person. As expected the subject’s galvanic skin response is high when they are shown the shocking pictures and subdued when they are shown the calm pictures. However, the interesting thing is what happens slightly before the picture is seen. Subjects react, albeit not as strongly as when they are actually observing the image, to the shocking picture even before it is seen by them. Once again the future seems to be affecting the present. Alternately, the subjects are (unconsciously) viewing the near-future, which amounts for my purposes to much the same thing.

A final phenomenon to take note of is that a network of Random Number Generators (which for this purpose were renamed Random Event Generators: REGs) has been running for a number of years at locations around the world. These were put in place to investigate the possibility that the REGs might register changes correlated to events in the world. Interestingly, exactly such a correlation was found, for instance with the funeral of Princess Diana and the announcement of the verdict in the OJ Simpson trial, both widely-broadcast and therefore focused-on events. The (tentative) conclusion is that collective human attention on certain events moves REGs. Considering the results of the Jahn studies at Princeton cited earlier, perhaps this is not too surprising. What is surprising (or more surprising) is that these REGs registered the devastation of the Indian Ocean tsunami of 2004 before (supposedly 24 hours before) the earthquake that caused it occurred! Likewise they supposedly anticipated the 9/11 terror attacks in the USA. This then appears to be a future event “casting a shadow” on the present state of electronic devices, the REGs.

Depth

As for deeper hierarchically negentropic systems embodying greater degrees of non-locality (tenet 12), this is one of those “looks right” statements, but there is evidence on either side of this proposition. Entangled electrons are certainly not as deep a HN system as a person, and yet they appear to display perfect non-locality. And if we compare people and their companion animals, is it generally true that it is the people which are more “psychic”? Among Rupert Sheldrake’s more recent books is one entitled, *Dogs that Know when their Owners are Coming Home* (1999). The title of the book pretty much states his findings. Note that it’s not the owners who know when the dogs are coming home, though. So at least on that score, the shallower HN systems (the

dogs) seem to have the edge. The third counter example concerns the Indian Ocean tsunami. It was found that no elephant keepers were killed in that disaster. When their handlers were interviewed, it seems that the animals sensed danger and took to the hills, taking the handlers with them. (Unfortunately I have lost the sourcing for this claim. Of course, even if it is accurate, it may have a more mundane explanation, such as acute hearing in the relevant octaves. Also it would be interesting to know when the animals became uneasy. Was it prior to or following the earthquake which caused the tsunami?) And of course there are the REGs associated with this event mentioned earlier.

And yet, and yet ... albeit without too much data to back me up, I continue to believe that the most attuned people exhibit a greater degree of non-locality than our animal friends (not to mention our entangled electron buddies). One possible example of this is in the area of “distant energy healing.” Of course this presupposes that one believes such a thing exists, but, in keeping with my *modus operandi*, I am not going to explore here the evidence pro and con, and just state that it does. Talented people are able to become a conduit of healing for others, even others in distant places. This skill requires a tuning in to the other as if space did not exist. In other words, one embraces non-locality. And although certain people can do this, there is no evidence that any other species is able to do so. Thus I confer the prize for non-locality to the species with the deepest hierarchically negentropic status on the planet. That would be us.

Now I realize that these examples are a long way from establishing tenet 12. However, if deeper HN systems have more interiority, which under the model they do, and if interiority correlates with independence from space and time, which psi effects suggest, then this tenet is likely true. On the other hand, it may be that this tenet has not been established to the full satisfaction of the reader (or, for that matter, the author). But there’s an old saying in aeronautics, “If it looks right, it is right.” As stated earlier, this looks right, at least to me. Whether it will fly or not, well, we shall see.

13. *Lower levels of the hierarchy in hierarchically negentropic systems have causal affects on higher levels and vice versa.*
14. *Also, causal affects operate from exterior to interior and interior to exterior.*

Down to up causality is just normal old scientific materialism. It is what Francis Crick was referring to when he said,

You, your joy, your sorrow, your memories, your ambition, your personal identity and your free will are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules.

As a good reductionist, he would then deconstruct molecules into atoms, atoms into sub-atomic particles, etc. Whatever’s at the bottom affects things above but not vice versa. We act, but since we are robots, our actions are just the workings out of sub-atomic particles. That’s the view.

By the way, the view of people such as Richard Dawkins is slightly different than this, at least in emphasis. From their perspective the principle unit of causality is the “replicator,” which would be the gene in biotic systems. Everything the organism does can, in principle, be explained by these “selfish” actors (selfish, petulant, and, it’s not going too far to say, positively Hitlerian). The phrase “at least in emphasis” in the above sentence is meant to indicate that they are nonetheless on board with the enterprise of deconstructing the gene further into more basic actors. Dan Dennett explains this approach as reductionism (the gene is the principle actor) vs “greedy reductionism” (attempting to explain human behavior in terms of the quark or whatever).

In any event, the view here is that causality runs both ways. If you’ve got a headache, you can take an aspirin and that may solve it. Matter to mind. On the other hand, if you meditate you may be able to relax your body and the headache may go away. Mind to matter. A materialist would say that “you” “deciding” to meditate is just the working out of sub-atomic articles, which is why trying to argue all this out with a committed materialist is probably no more likely to succeed than arguing about the reality of evolution with a committed fundamentalist. Collingwood would say that they are exhibiting their “absolute assumptions.” These assumptions often exhibit what I sometimes refer to as “viewpoint lock.”

There's a question, a certain question I want to discuss with you. It's a political question ... the question of marriage.

It's a political question?

Well yes. Everything's political. Like everything else the relationship between a man and a woman has a socio-economic basis. Marriage must be based on mutual beliefs, a common attitude and philosophy towards society.

And affection.

Well, yes, of course that it is also necessary. Such a relationship can have positive social value when two people face the world with unity and solidarity.

And affection.

At any rate I personally am in favor of such a socio-economic relationship.

– from *Fiddler on the Roof*

A committed Marxist sees everything in terms of politics. A committed Freudian sees everything in terms of sex. A committed reductionist sees everything in terms of simpler units of matter. In the view here causality goes downward because higher levels of the negentropic hierarchy contain more interiority and interiority, at any level, “wants” to become more so. Thus the lower “wants” to conform to the higher (thereby becoming more negentropic) and is therefore amenable to “suggestions from above.” As others have conceptualized it, the organism (the higher negentropic system) imposes a probability field on lower levels of the hierarchy (organs, cells), causing these levels to probabilistically conform to this field. So upper to lower changes the probability of events “down there,” causing them to become less random and more patterned. Note that upper to lower does not eliminate randomness, only reduces it. Note also that the upper will typically delegate most of the action, and decisions, to the lower. You may be able to lower your heart rate via meditation, but typically you just let it do its thing. And in all likelihood you don’t even know what your spleen does, let alone how it does it. And it generally

doesn't need any suggestions from you, the higher negentropic system, to do its thing (whatever that may be).

The same general analysis applies for out-to-in and in-to-out. The aspirin mentioned above can either be considered down-to-up or out-to-in. The most famous example of in-to-out causality is the “observer effect” of quantum physics. I take this effect to be the essence of this field of study for those of us not immersed in the daunting mathematics and laboratory techniques of this discipline. Stated simply, the observation of a quantum system affects the system. Since all matter is ultimately made up of quantum systems (wave/particles), this can be stated as, *The observation of the universe affects the universe*. Merely the act of you (and perhaps your cat—or or Schrödinger's ☺) observing a system affects it. (Thus to Laplace's contention that were one to know the condition of everything in the universe, it would be possible to predict everything that came thereafter, the counter-statement is that the mere knowing, i.e., observation, of this would therefore change it. And if it is changed, one no longer fully knows it.) Many excellent popular books have been written on this subject, so I won't recapitulate the material here. But let's just take the most basic experiment, that of the double slit, for review. Nobel Prize winning physicist, Richard Feynman: “The experiment with two holes ... contains the only mystery ... of quantum mechanics” (quoted everywhere).

The protocol is that one has a light source, then a blocking screen with two thin slits in it, and then an observing screen on which one can observe the light after it passes the blocking screen. Because light is a wave (well, sort of), when it passes the blocking screen, it shows up on the observing screen as bands of light and darkness (assuming the slits are narrow enough), which are interference patterns. These are similar to interference patterns in a pond if you simultaneously throw two stones in the water. In some places the top of a wave from one stone will be in the same place as the top of a wave from the other, with the result that you get a big wave at that point, the addition of the two waves. In other places the top of one wave will be in the same place as the bottom of the other, and they will cancel each other out at that point. That's essentially what you observe on the observing screen, although the bands of light and darkness will be displayed horizontally, like a bar code.

Light consists of photons (which is why it's only “sort of” a wave) and these little “balls of light” can be shot one at a time through the blocking screen (although this is typically done with electrons). If you do that, you still get the interference pattern on the observing screen, which indicates that the photons are entangled across time (tenet 11). Now what happens if you observe which slit those little balls of light go through, that is, the left or the right slit? What happens is the interference pattern disappears and the resulting pattern is consistent, not with the interference of waves, but rather with what one would see if the little balls were actually little physical balls, say of paint. Observing the system affects the system. Even stranger one can observe the photons between the time they have left the blocking screen and before they have arrived at the observing screen, in mid-flight so to speak. So if they are waves, they have already passed through both slits (in order to create the interference pattern). Observing the photons in this manner, after the fact, causes their wave character to disappear and their particle character to reappear. This is called “collapse of the wave function,” and it's about as much quantum physics as I'm going to present here. Bottom line: The observation of the universe affects the universe. Second bottom line: Observation now can affect the universe then:

“The universe is not [only] stranger than we know, its stranger than we can know.”

– Richard Feynman

One note: There are supposedly about a dozen models of quantum physics, one for every taste:

First peasant: Why should I break my head about the outside world? Let the outside world break its own head.

Tevye: He is right. As the Good Book says, “If you spit in the air, it lands in your face.”

Revolutionary: Nonsense. You can't close your eyes to what's happening in the world.

Tevye: He is right.

Second peasant: He's right and he's right? They can't both be right.

Tevye: (playing the role of quantum physics). You know, you are also right.

– from *Fiddler on the Roof*

In the model I am using here (“you are also right”) observation by a person (or cat) is not the only thing that collapses the wave function. Rather any flow of information from the quantum to the classical world does so. Otherwise the universe would have had to evolve for 14 billion years in super-position until a human (or similar) observer came along to flip it into classical space/time. A few quantum physicists subscribe to this model. But although all quantum models involve paradox, this is “a paradox too far” for my taste. Recall Paul Davies’ speculation about the reason the universe is bio-philic above: “consciousness did it.” In that speculation consciousness in the future (or at any time) affected (or affects) the very structure of the universe at the time of the Big Bang. If so, then sufficient interiority may be “baked in” to the structure of hierarchically negentropic matter to account for spontaneous collapse of the wave function (“objective reduction”). So in the model of quantum physics adopted here, leak of information from a quantum particle/wave equals measurement of that particle/wave equals observation of that particle/wave by a hierarchically negentropic system. (Thus another title for this essay could have been *Evolution and the Observer Effect*.) This is because observation (interiority) is an inherent aspect of hierarchically negentropic systems. I suppose paradoxes are like eggs for breakfast. You order ‘em the way you like ‘em.

15. *As reductionism only fully recognizes the former affects (lower to higher and exterior to interior), it is wrong, or at least incomplete.*

16. *Idealism, while not a major force in today’s world, makes the opposite mistake.*

Reductionism.

Reductionism was briefly dealt with above (when I said it wasn’t worth arguing with a person holding such a view: “At any rate I personally am in favor of such a socio-economic relationship”). The examples I gave were intended to establish that effects go both ways, lower to higher and higher to lower, as well as exterior to interior and interior exterior. Nonetheless, I echo the view of McFadden on this issue:

All ideas have their time and I expect that the twenty-first century will see the flowering of quantum biology. Its roots can be traced back to Schrödinger’s (1944) “What is Life,” but

though that slim volume stimulated many scientists (such as James Watson) to consider life's physical basis, reductionist biology needed to run its course and dissect living cells down to the level of fundamental particles before its full implications could be appreciated. I believe we are now on the brink of a new adventure which will bring about the synthesis of physical and biological sciences through quantum mechanics. (McFadden, 2000, p. 265)

Idealism.

Idealism comes in several flavors. The most extreme version says that everything is mental and nothing is real except perception. In other words all objects are mental objects. Amit Goswami, a quantum physicist, espouses a variation of this view when he says that the moon doesn't exist except when we (or presumably someone else) is looking at it – albeit, in his view, it does exist as a mass of zillions of quantum objects in super-position (Goswami, 1993, p. 59). That's pretty extreme. And, needless to say, it is not falsifiable, although, to give him his due, none of the various schools of quantum physics can be ruled out (falsified). It does no good to say, "That's crazy." They're all crazy.

Do not keep saying to yourself, if you can possibly avoid it, "But how can it be like that?" because you will get "down the drain," into a blind alley from which nobody has yet escaped. Nobody knows how it can be like that.

– Richard Feynman

Most idealists, though, do not deny the existence of independent objects in the world. They just say that those objects are not *ultimately* real. God, mind, consciousness, or an equivalent is the only ultimate reality. So most religions are forms of idealism in this sense. And as with the hard-core reductionist, there's not much point in getting into an argument with someone about their God. ("At any rate I personally am in favor of such a socio-economic relationship.") Once again, the view here is that, either for all practical purposes or for real, interiority is a co-equal to matter/energy. And, once again, I don't ultimately try to figure out "who's on first."

Who?

Yes.

I mean the fellow's name.

Who.

The guy on first.

Who.

The first baseman.

Who.

The guy playing ...

17. *Up-to-down and in-to-out causality are, to some extent, the same thing, since systems with deeper levels of hierarchical negentropy embody greater degrees of interiority.*

18. *Likewise down-to-up causality is, to some extent, the same thing as out-to-in causality.*

These tenets follow from the previous ones. Tenet 17 appears to embody the opposite property of these systems as laid out by Ken Wilber in SES in which he, following Francisco

Valera (a sometime collaborator with Evan Thompson), asserts that lower holons “see” their upper counterparts as being outside themselves (Wilber, 1995, p. 59), while here I am saying that such physical holons (hierarchically negentropic systems) “see” their upper counterparts as inside themselves. I suppose, according to Wilber’s philosophy, the difference between these points of view would be that Valera is talking about the exteriors and I am talking about interiors.

In any event, as mentioned several times previously, the idea is that upper level HN systems impose something like an *information/probability (IP) field* on lower level HN systems. Exactly *how* this is done is “beyond my pay grade.” How does gravity work? Until Einstein the answer was, *It just does*, and I’m no Einstein. (And for that matter, and in a similar vein, Darwin had no idea where heritable variation came from.) A problem is that while individual particles, such as a proton, can reside in super-position and thus can be amenable to a field effect from cells, for example (upper level to the proton), cells themselves are fully classical systems and thus cannot, in our current understanding (or at least in my current understanding), reside in super-position (unless they are cooled to near absolute zero, at which point they aren’t of course living cells any more). (One could nitpick this and say that nothing is a fully classical object, but the above is close enough for my purposes.) So how does the an organ (like the heart) or the whole organism itself (like a cat) project its influence downward to the cell? Luckily this is a paper on natural philosophy rather than science, so hopefully I can get away with *It just does*. That’s my plan anyway.

Okay, okay, I’ll speculate. One possibility is that each level of an organism (advanced hierarchically negentropic system) has its own mind (or, if you prefer, “mind”) associated with it. Single celled organisms have no brain, but they exhibit intelligence, a mind-like quality, in seeking food, avoiding prey, reproducing and the like. Likewise we may speculate that a “gut feeling” exhibits the “mind” of one’s “gut” (i.e., the digestive region). A property of mind, it would seem, is to hold possibilities in super-position. When I am trying to decide something difficult, it feels like I am levitating the possibilities in mid-air and preventing them from collapsing to earth prematurely: “I could do this or do that or the other thing.” So my speculation is that super-position at the atomic level is referred upwards via the various levels of mind (or “mind”), which also holds them in super-position. How? It just does. And, just to make speculation even more speculative, when we are trying to figure out something new, for example, the calculus pre Newton, possibly we refer it upwards to a “level of mind” above our own. At least that’s what it feels like to many artists and scientists when the answer materializes in “mid air” so to speak.

A contrasting, more conservative, view on this particular issue is provided by Johnjoe McFadden. He states that “life is a system that uses internal quantum measurement to capture low-entropy states that sustain the state of the system against thermodynamic decay” (McFadden, 2000, p. 258). So far, so good. But while it’s not totally clear to me whether he sees that internal measurement extending upwards from the level of cells to that of organs, and then to that the organism itself, my best read is that, in his view, it doesn’t. However, he does see quantum processes linked to human consciousness. So in this view quantum effects are turned on (basic life operations), then off (level of the organs), then on again (consciousness) as one rises

in the biotic hierarchy. Maybe. In any event, as stated above, the view here is that quantum observation/measurement does extend upwards.

By the way, compare McFadden's definition of life with the following definition by Amit Goswami.

A living being consists of tangled hierarchical quantum measurement apparatuses that are representations of the vital blueprints of biological functions including, but not restricted to maintenance and reproduction. Such a being is capable of self-reference because in the process of quantum collapse involving it, consciousness identifies with the being. (Goswami, 2008, p. 129)

Pretty close, and because this book does not reference McFadden's, presumably independently arrived at.

19. *Taken to its logical end point, the ultimate hierarchically negentropic system would theoretically be totally non-local as to time and space and share an interiority common to all such systems lower in the hierarchy, including all life forms. The overlap between such an ultimate hierarchically negentropic system and what the religiously inclined call "God" is reasonably evident.*
20. *Because life continues to evolve, such an ultimate hierarchically negentropic system would logically also continue to evolve.*

I am not saying that there are any hierarchically negentropic systems above the human level. On the other hand, I don't see why there shouldn't be. Do we really think we're the best thing this old universe can come up with? If more advanced HN systems do exist, and if we are part of them, it's only speculation as to what form they might take. Perhaps the picture of a colony of cells, like a jellyfish colony, forming a single organism over evolutionary time provides an analogy. And possibly the internet might represent the hardware for the nervous system of such an organism's mind, a "precipitation" out of quantum space of a primitive world brain. As with the jellyfish prior to a united organism being formed, it may be that this upper level exists as a "virtual" or "implicit" system, an "attractor" that pulls the colony towards it. Further, if interiority is to any extent non-local, then it's just another jump to imagine that this world mind, if it exists, might form a cell in a universe mind, with other inhabited planets forming other neurons within the brain of this higher level mind (or, if you prefer, higher level being).

Naturally this is the purest of pure speculation, but it does, at least indirectly, come into play when I consider below how upper level hierarchically negentropic systems direct and create the "probability space" for their lower level counterparts. A premise of this paper is that this work, creating the "space" from which natural selection can choose, is the property of the HN system itself. This premise is in contrast to both neo-Darwinism (the creative, or option-producing, process is totally random) and to Intelligent Design (ID; God, or an equivalent, is the creative agent). However if interiority accumulates upwards, if, per Emerson, we are all part of some great cosmic ocean of consciousness in the deepest reaches of our being, then the view presented here is not totally incompatible with a *radically* liberal construction of the ID view. By analogy it

is somewhat like the difference between a super-computer as a giant, unified hunk of iron (HAL in the movie, 2001, the ID view), or as a giant network of fairly dumb regular old personal computers chained to some purpose (the view here). The later is the standard way to create super-computers these days, and in some ways the internet is the ultimate version of this model (though, unlike a super-computer, the internet is not centrally directed... well, not unless Google has somehow secretly taken over our computers!).

The model here has intelligence distributed to the utmost extent, down to the atomic level and below. Which then accumulates upward, at which point the upper acts as an “attractor” on the lower (and, as speculated above, may do so even if the upper level is not yet formed but only exists in a virtual, implicit, or quantum form). So if there is such a system above the human level (or if it exists as an implicit form), then it may be directing a teleological “pull” on humanity. But, as I said, this is all total speculation, and all I want to do it to put it out there as a logical possibility. The system here allows, but does not require, it. (Similarly quantum physics allows for something like mysticism—remember Max mind-is-the-matrix-of-all-matter Planck—but does not require it.)

One major difference between even a radically liberal construction of Intelligent Design and the view presented here is that ID, in concert with the Modern Evolutionary Synthesis sees no biological creativity at the cellular level: “Cells are robots” per Michael Behe, prominent ID theorist (2007, p. 19). The neo-Darwinian view is similar: “Each one of us is a machine” (Dawkins, 1996, p. 3). The view here, in contrast, is that each level of a hierarchically negentropic system has, along with a degree of interiority, its own creativity. And the assumption is that these two, interiority and creativity, are linked for the purpose of maintaining or increasing negentropy.

One more thing. Prominent contemporary objectors to religion and to the idea of God such as Messrs. Dawkins (2006), Dennett, Hitchens and Harris (2004), most basically object to the idea of a supernatural Entity (or entities). If the laws of physics don’t allow changing water directly into wine (whether Chablis or Chardonnay) then we can’t credit stories of chaps doing exactly that. In other words, their books on this subject essentially object to pre-rational, bronze-age thinking, of which they lovingly recount many florid examples. Fine. But what I am talking about here is something else. It is whether interiority is a byproduct of matter at a certain level of complexity (their view), or alternately whether the embrace of interiority and negentropic matter goes back to first principles in somewhat the same sense that mass and spin go back to first principles. And, if this latter view is correct, as I and many others claim, then what might be the implications for evolution? The first view envisions the evolution in the universe, by analogy, as a tumbler of dice connected to a machine. The second, echoing Sir James Jeans in a quote above, sees nearly the opposite: “The universe begins to look more like a great thought than a great machine.”

The Picture

Such are the tenets, but I haven’t really sketched a picture of how these might actually operate in evolution. For a start, my view is that the Darwinian proposition, that natural (and sexual) selection drives evolution, is largely correct. But I argue here that neo-Darwinism, under which

random mutation alone creates the design space from which natural selection picks and chooses, is too narrow to account for the data at hand. This is not to deny that an “arms race” (Dawkins) between genes takes place at their level. It does. It’s just that there is more going on, on more levels, than that metaphor allows for. I will start out with an example that illustrates a problem with both the neo-Darwinist (MES), and the Intelligent Design (ID) approaches. This example is taken from *Quantum Evolution* (McFadden, 2000, pp. 271-272).

Tuberculosis (TB) is an extremely deadly pathogen. Initially, it was successfully treated with streptomycin. However, in time TB developed a resistance to this antibiotic. This is explained straight-forwardly since a resistant mutant will generally be found in one in every 10^8 bacilli. However, the human body can harbor 10^9 of these bacteria, so it’s just a matter of time before a successful mutation will take hold and multiply. The response to this was to start treating patients with multi-drug therapy. If mutations in TB conferring resistance to a drug A occur in one of every 10^4 bacteria, and to drug B in one of every 10^5 bacteria, then a mutation that successfully withstands both drugs should occur in one of every $10^4 \times 10^5$ or 10^9 bacteria ($10^9 = 1,000,000,000$, or one billion). With four drugs combined one would expect a successful mutation in one of 10^{24} bacteria. This is about 2.2 billion pounds worth of TB, way more than exists in the world, let alone in any one patient, obviously. According to standard neo-Darwinist theory, it’s useless for a TB bacillus to develop resistance to just one drug, since it won’t pass along any progeny to develop resistance to the second drug. It’s like an obstacle course (except that you, as a tuberculosis bacillus, can take obstacles in any order you wish). If you get eliminated by the wall-climb, you (or actually your progeny) don’t get to go on to the ropes, etc. Therefore multi-drug resistant TB should never develop because all TB bacilli should be eliminated after the second or third “obstacle.” Yet it does, and it’s a major health problem throughout the world. This phenomenon is sobering when one contemplates its unfortunate implications for the development of permanently-efficacious antibiotics.

This is a very simple biological problem and yet, unless further research indicates otherwise (which, obviously, it could do), neo-Darwinism can’t successfully solve it (a statement to which I would not expect assent from the biological orthodoxy). And according to McFadden the same analysis can be applied to cancer (McFadden, 2000, p. 273), another health scourge. So the Modern Evolutionary Synthesis appears to be in trouble, even if this isn’t generally acknowledged. Naturally this example is not much solace to proponents of Intelligent Design either, at least if God is the presumed agent that overcomes “irreducible complexity,” of which multi-drug-resistance is an elementary example. We would have to imagine a God Who is working overtime to loose pathogens on the human race. (Perhaps a cousin to the Sociopath of the Old Testament? Strangely enough, Michael Behe in *The Edge of Evolution* actually entertains such a morbid viewpoint when he asserts, “Malaria was intentionally designed” (Behe, 2007, p. 237). Yes, it’s conceivable (if just barely), but it doesn’t seem likely. Following a dictate of Achem’s Safety Razor (sic), we should probably endeavor to keep miracles to a minimum, especially if they are the type that kill us.

The next example concerns the work of Harvard biologist John Cairns and colleagues, who, in the 1980’s, studied a strain of Escheri Coli bacteria. Normally this particular strain is unable to metabolize lactose. But when they exposed the bacilli to lactose and deprived it of all other foods, the bacteria became the beneficiaries of a mutation allowing lactose metabolization, while

a control group, not deprived of other foods, had no such beneficial (to the organism) mutation. This appeared to be directed (or “adaptive”) mutation in defiance of neo-Darwinian principles, under which all mutation is random. When these results were published in the prestigious journal, *Nature*, it set off a furor. (Of the resulting papers my favorite title asks, *Has the Unicorn Landed?*) Following that uproar Cairns did back off somewhat in his initial claim as to the degree with which mutation was (or appeared to be) directed, subsequently claiming only (only?) that the rate of mutation was preferentially directed to a particular *region* in the genome. In other words, one address of the genome, an address relevant to the environmental stress the organism was encountering, was made to mutate faster than it normally would, and faster than addresses on either side of it.

Others such as Professor Barry Hall at Rochester University have also detected adaptive mutation in a variety of bacterial systems. In one of his most recent experiments, Hall measured the mutation rates in non-growing E.Coli cell for two different DNA bases in the same gene. When neither gene was beneficial, then mutations occurred at the same rate, but when one conferred a selective advantage, then its mutation rate was enhanced. (McFadden, 2000, p. 263)

While these examples are not as dramatic as (my understanding of) Cairn’s original claim, they still appear to represent an organism shaping and directing its genome. We might call this “soft” directed mutation. What is clear is that there is *some* level of downward causation going on here. It’s simply a matter of degree. As alluded to below, the view of McFadden is that these mutations happen in quantum space, and then are precipitated out when they can be utilized by the bacteria to aid in their survival.

Another similar example of what may be adaptive mutation is recounted by Brown University biologist Ken Miller in his book, *Only a Theory* (2008, p. 80), in which he recounts the story of bacteria which apparently adapted to metabolizing nylon in the absence of other foods. Miller, who doesn’t deal with adaptive mutation in his book, offers this as an example of general biological creativity in evolution. In contrast to the Cairns experiments (and despite language in the book to the contrary) here the bacteria were apparently not facing starvation but rather something more like prolonged hunger (personal communication), and thus more normal MES principles may have been in play.

As suggested in the opening of this essay, the Cairns experiments may represent a kind of Michaelson-Morley experiment for our time. To repeat, that former experiment ruled out the luminiferous ether (or at least put a couple of torpedoes in its hull), and set the stage for Einstein’s relativity theory. The Cairns experiments, in the view of some (if by no means most) scientists, rules out the heart of the Modern Evolution Synthesis formulated in the first decades of the twentieth century, as the sole mechanism of genetic adaptation. Per the result of Cairns (and others), genetic mutation is, in part, directed by the organism (or the organism and its environment) and is therefore not totally random as required under neo-Darwinism. Therefore these researchers have demonstrated downward biological causation (see one take on this here http://www.kenarenson.com/uploads/Memo_re_Directed_evolution.pdf).

The next example is somewhat similar to the above. However, it demonstrates beneficial (to the organism) mutation in a body of cells not exposed to a toxin, apparently picking up information on selection pressure from a subset of these cells that are exposed to it (Hill, 2000). The head researcher was Miroslav Hill from the Medical Faculty, Brno, Czech Republic. As best I understand the protocol, Hill and his colleagues grew hamster cells in culture, separating a portion of the culture in each period, and exposing them to a toxin, with the main body of the culture remaining unexposed. The reason for doing this was to simulate a much larger body of cells exposed to the toxin. In this way, the researchers could determine what percentage of cells randomly mutate to confer resistance, as under the MES. At first all the cells in the separated portion (those exposed to the toxin) died. After a number of repeats a few cell colonies resisted the toxin, then many did so. Interesting. And even more interesting, the main body of cells, which were never exposed to the toxin, *also* acquired resistance to the toxin. This is totally in conflict with neo-Darwinian principles. This example, emailed to me by Dr. Sheldrake, indicates how his proposed morphic (information/probability) fields may fit together with neo-Darwinian genetic evolution (although he has not, as far as I know, formally developed this line of reasoning). Namely (this is my interpretation) the unexposed cells may share a dilute version of the environment experienced by the exposed cells. Vaguely similarly to the way we can acquire resistance to polio or the flu by being exposed to a dilute version of these pathogens, so the unexposed cells may be “inoculated” by virtue of the experience of their exposed “brethren.” Thus some form of at least partial non-locality (entanglement) seems to be connecting the cells either by a “morphic” (information/probability) field, or by some other means. (For a fuller description of Hill’s findings see the 2009 revision of Sheldrake’s *A New Science of Life*, pp. 258-262)

The final example is what amounts to a kind of folk observation. And that is that camels, kangaroos, and people, among other species, all have calluses where they need them, and nowhere else. Are we to imagine that a callus-conferring gene was established and then started slapping areas of thick skin on the bodies of camels higgley pigiley, with natural selection sorting out that a callus on the top of one foot or the inside of its intestine isn’t of much adoptive value? Which is more likely, that totally random mechanism, or one where some kind of feedback loop exists between the animal and its genes (phenotype to genotype), that is, some kind of neo-Lamarckian mechanism? (Darwin, quoted earlier: “From the facts alluded to in the first chapter, I think there can be little doubt that use in our domestic animals strengthens and enlarges certain parts, and disuse diminishes them; and that such modifications are inherited.”)

I think the answer is reasonably evident. However, neo-Darwinists don’t see it the way Darwin did. Richard Dawkins devotes a number of pages in his *The Blind Watchmaker* (p. 298 onward) to debunking what he identifies as this “myth.” His main point is that genetics is a recipe (mix two cups of flour with a tablespoon of yeast, etc.) as opposed to a blueprint (e.g., of a house). So there is no one-to-one correspondence with a genetic trait (calluses on the bottom of feet) and a gene. (Of course Mendel found exactly such one to one correspondences, but this is not important for the argument here; we can concede that these correspondences don’t normally exist.) Therefore there might be a gene (or series of genes) that say, in effect, “If a patch of skin gets rubbed, make it thicker.” This would then explain thicker skin where kangaroos are abraded, but it leaves out any explanation of why a “joey” (baby kangaroo) would have appropriate calluses “in utero.” If we imagine an “uhr-kangaroo” with no calluses as a joey but with thicker

skin as an adult, how does it come to pass that this trait gets transmitted to the unborn infant? Once again, under the neo-Darwinist (but not Darwinist) viewpoint it would seem that evolution must have slapped calluses here and there and let natural selection work things out. The trait for forming calluses where needed seems straight-forward, but the trait for pre-formed calluses, in the absence of phenotype to genotype feedback, does not. In my mind anyway, Dawkins and his cohorts have not made the case. (This may be another instance of, “If all’s you’ve got is a hammer....”)

McFadden, a minority of other biologists, and the quantum physicist Amit Goswami, among others, believe that instances of partially directed mutation exist. And while this seems fairly evident from the work of Cairns and others, it is nonetheless not accepted by most biologists, wedded as they are to neo-Darwinism orthodoxy. As mentioned earlier, per McFadden the mechanism for this phenomenon is quantum measurement of atoms along the DNA molecule by the cell and its environment. I provisionally accept his proposed mechanism, but I am not going to even attempt to explain it here except to say that the general idea is that in quantum, as opposed to classical, space, the genome can explore myriad different permutations all in “superposition” prior to measurement and precipitation into classical space, which happens once a genome is able to replicate (e.g., by being able to metabolize lactose). As I have alluded to previously, in his view this process is confined to single-celled evolution, with neo-Darwinian processes taking over at the multi-celled level. (For details see McFadden’s *Quantum Evolution*).

But here I am casting my net somewhat wider, albeit in a less “nailed down” scientific way, and more in a way compatible with the term, natural philosophy. First of all, I surmise that the same process implicated in directed mutation is also at work in novel molecules crystallizing (and in protein folding) a la Sheldrake. I also surmise that, much as a cell may precipitate a directed mutation, or a series of them, out of quantum space, so the same general process is at work when someone, and very often two people simultaneously, precipitate a new idea out of who-knows-where (the noosphere? the quantum multiverse?): Darwin and Wallace (evolution by natural selection), Newton and Leibnitz (the calculus), Freud and Jung (the unconscious), the list goes on.

As suggested earlier, it may be that what McFadden sees as an act of “quantum measurement” is simply the outside of what from the inside is “perception” by the interiority of a hierarchically negentropic system. This is more or less Goswami’s view, although he tends to conflate that interiority with “quantum consciousness” in the largest possible sense, that is, with God. In his view things can be made to fall in place “when God-as-quantum consciousness is recognized as the organizing principle of creative evolution in biology” (Goswami, 2008, p. 44). My preference is to limit use of the “g” word, as I find it generally just confuses things (gather a thousand people and you will likely get a thousand different definitions for god). So in the tentative formulation envisioned here, higher levels of a HN system perceive (measure) lower levels, which prior to this perception (measurement) exist in a state of indeterminacy, and thus the upper level chooses, or at least probabilistically influences, the lower level into a preferred (by the organism), more negentropic, state. Once again I am not attempting to posit the mechanism of this perception/measurement except to speculate, as above, that lower HN systems may have a kind of proto-mind (or “mind”) of their own, which has the effect of suspending “virtual” states in super-position. (I would also note in passing that according to the traditions of Idealism east

and west, there *is* no mechanism, just as there is no “mechanism” for the charge or spin of a particle. This correlates with the view presented here that interiority is an inherent aspect of hierarchically negentropic systems, that hierarchical negentropy and interiority are basically the same thing as seen from different perspectives).

So when a high level hierarchically negentropic system intends an outcome from an indeterminate future, what it may be doing is perceiving/measuring one among perhaps trillions of outcomes super-positioned in an indeterminant quantum space. And by actively perceiving it, causing (or, more likely, probabilistically influencing) it to happen. (Thus the admonition to not focus on outcomes you don't want to come into your life, which, of course, has to be balanced against noticing that truck bearing down on you).

The Hypothesis

So, my hypothesis is as follows: Hierarchically negentropic systems are associated with partially non-local information/probability fields. These fields entail or express interiority and carry information, in the form of solutions, to other similar HN systems directly (“entangled learning”). In biotic forms of HN systems two additional factors come into play. First, this information is carried in particular to progeny, which process could be considered to constitute non-genetic (or “Sheldrakian”) evolution. Second, the field effect of this information causes otherwise random mutation to become somewhat non-random, thus partially directing genetic evolution via quantum observation/measurement. Evolution in all domains is best understood from a dual “inside” (observation) and “outside” (measurement) perspective.

Regarding genetic evolution, Richard Dawkins has said,

We can imagine (just) a form of mutation that was systematically biased in the direction of improving the animal's adaptedness to its life. But although we can imagine it, nobody has ever come close to suggesting any means by which this bias could come about. (Dawkins, 1986, p. 312)

My speculation is that the above information/probability field effect may be that means.

Kauffman and Thompson

Reviewers of earlier drafts of this essay suggested that I should contrast the views presented here with those of Stuart Kauffman and Evan Thompson. For the former I refer to his *Investigations* (2000) and *Reinventing the Sacred* (2008). For the latter I refer to his *Mind in Life* (2007). I am not attempting a comprehensive critique of these writings, nor I am claiming to have fully mastered the theory of either writer. Kauffman appears to believe that autonomy and interiority vanish below the level of autocatalytic sets, and Thompson similarly believes that they do so below the level of autopoiesis, whereas I am saying that “entangled learning” and presumptively interiority exist at least at the molecular level, if not lower. Autocatalytic sets are chemical reactions which are self-creating. So if we have four chemicals and they are related such that

A → B → C → D → A

then these are autocatalytic. Autopoiesis adds the conditions that the set is bounded in a membrane and that it reproduces itself as a set. So to self-creating, add self-reproducing. Both gentlemen believe that below either autocatalysis (Kauffman) or autopoiesis (Thompson) it's "all just physics," by which I mean that the principles embodied in the Abstract at the beginning of this essay do not obtain:

It is hypothesized that hierarchically negentropic systems (defined herein), including organisms, are associated with partially non-local information/probability fields which, a) entail or express interiority, b) engender "entangled learning" with similar negentropic systems, and c) cause otherwise random processes, including mutation in biotic systems, to become somewhat non-random.

I am saying the evidence seems to indicate that even molecules (and presumptively more basic constituents of matter) "learn" (Sheldrake), and that this "learning" appears to have the same non-local characteristic which is associated with conscious learning of, for instance, rats or people. In particular I am suggesting that the DNA molecule participates in this kind of "learning," and that it is amenable to being affected by the consciousness of organisms of which it is a constituent part. Furthermore, I am saying that hierarchically negentropic systems of all sorts, not just organisms, embody something akin to consciousness, namely "interiority," which is associated with this learning.

Both Kauffman and Thompson profess "emergent" views, which is to say that at some level, for instance autopoiesis, something emerges that was not present before. In a general sense this is obviously true. Cats clearly act differently than rocks. On the other hand, if rocks are totally mechanical, fully explainable in terms of physics, then where does this "something" come from? A very, very complex machine is, after all, still just a machine. Neither Kauffman nor Thompson answer this question. With others, I am saying that qualities we identify with living systems, interiority among others, exist, at some dilute degree, even in matter at its most basic level. In a sense I am saying, as against Kauffman and Thompson, that there is no such thing as totally "dead," "insensate" matter. Furthermore it appears to me that quantum processes are implicated in interiority (and vice versa). And as a concluding generalization I would say that, with others, my model embodies a vision of mind/interiority that is joined to hierarchically-organized matter at a much deeper level than envisioned by either Kauffman or Thompson

The Model

With tenets introduced and discussed, and my hypothesis given, it is time to present the model. Parts of the model presented below are based on evidence. Other parts are conjectural.

Organisms, advanced hierarchically negentropic systems, attempt to survive, to maintain their negentropy, both in themselves and through their progeny, as well as, to a lesser extent, through genetically related organisms (and perhaps through other organisms related in some other way, co-religionists for instance). They also feel a teleological pull towards greater negentropy, and towards greater interiority (the same thing seen from the "outside" and "inside"). These

dynamics are at play both at the genetic level (“selfish genes” want to propagate themselves as portrayed in sociobiology), at the level of the organism, and at the level of the species (and perhaps higher). Every hierarchically negentropic system is attempting to maintain or increase its negentropy. Thus genes direct the organism, but the organism also directs the genes via partially “adaptive” mutation (Cairns). This is done via the creation of an information/probability (IP) (morphic) field by the organism. And genes as well as other hierarchically negentropic systems, such as organs, also create their own IP fields (and thus have their corresponding levels of interiority).

There is “something that it’s like” to be in such a field. This feeling is the interiority, or proto-consciousness of the organism, projecting outward into the environment, and downward into its organs, cells, and genes (and further downward to atoms, etc.). When the field maintains itself, life is maintained. Same thing. When the teleological “pull” of the next higher field (i.e., from a higher level negentropic system, which may only exist as an “implicit” reality in super-positional quantum space) comes into play, this is the action of directed evolution. (For those familiar with his writings, this is an example of Dan Dennett’s prohibited – by him – “sky hooks.”) If the “feeling” of this higher field could be translated into human language (which it can’t be, and which of course represents outrageous anthropocentrism), it might be something like, “I wish I could swim faster” or whatever (“thought” by millions of fish). In other words, it’s not just an abstract thought (to the extent that the organism—or molecule for that matter—in question can formulate a thought), but a “thought” backed by desire, the desire to live, to strive against entropy, which is the most basic desire of any organism (or other hierarchically negentropic system). So organisms “push” against, and shape, their “genome space” in the same general manner that people can “push” against the probability field of a Random Number Generator, causing it to become slightly non-random.

If a gene is precipitated out of the quantum genome space, which is useful in helping the organism to survive better, then this “solution” (the gene) becomes more likely to be precipitated by other similar, or identical organisms elsewhere. There’s “something in the air” concerning a solution, and these related organisms then become more likely to “chance upon” the same mutation. This mutation may pop up simultaneously, or near simultaneously, at various locations around the world. And the more it precipitates, the more likely it becomes to do so. (This is an extrapolation of Sheldrake’s finding.) At the same time, normal neo-Darwinian processes are at work, and those organisms that acquire the lucky mutation from their parents likely will have more offspring. And on it goes.

As explained earlier, in McFadden’s view quantum evolution, roughly the process described above (albeit without reference to the “inside” interior dimension of things) ends where Darwinian evolution begins, which he sees being with multi-cellular organisms. The view presented here is contrary to his in this respect since I speculate that macro-evolutionary jumps—for example, mammals take to water and breath through their backs—need the “juice” of quantum superposition. In this respect, the view expressed here is similar to Goswami’s, who sees a swing between neo-Darwinian (micro) and quantum (macro) evolution when big jumps happen. However, what exactly the mechanism for this might be is unspecified here. If the view here, that quantum evolution continues after Darwinian evolution gets traction, is correct, then perhaps the “butterfly effect” (that tiny changes in one place can cause large effects elsewhere),

may be a part of the mechanism. In other words, tiny (initially quantum) changes may be amplified upwards into macroscopic morphological changes. After all, even in the standard MES view, changes in a few genes can produce these large kinds of effects.

So, at certain times in evolutionary history greater challenges (or opportunities) will arise. In these cases it isn't just one gene that would allow a biological jump to be made, but perhaps a whole family of genes. These are the "irreducible complexities" of Intelligent Design proponents (although most of the examples these proponents cite, such as the development of the eye, probably have satisfactory gradualist, neo-Darwinian explanations). In this case a whole series of super-positioned genotypes have been propagating in quantum space (alternatively, in the multiverse). When one of these "hooks up" to the phenotype (the organism) in such a way as to increase negentropy (and replicability), then this "quantum genotype" is precipitated out. In short order (geologically speaking) fish take to land, land animals to water, dinosaurs to the air, organisms learn to navigate great distances, they become warm blooded, produce live young and acquire the means to suckle them, acquire opposable thumbs, their brains grow explosively, and the list goes on. (If species on the top of negentropic "hills" are ever separated by entropic "valleys," then something like this must necessarily be involved since the MES requires each genetic change, if it is to be propagated, to be "higher" than the adjacent phenotypic space. It is unclear to me whether evolution presents such a "hilly" landscape.)

Moving down the evolutionary scale to the pre-biotic, the same kind of process happens when novel molecules learn to crystallize for the first time, only this time genes are obviously not involved. The molecule "wants" to crystallize, and it projects a probability field with this "desire" (outrageous anthropocentrism again). This projection pushes on the quantum version of the molecule, which is going through perhaps trillions of permutations all at once, all in quantum super-position, until, finally one, with a local energy minimum, precipitates out into classical space, and the molecule crystallizes.

This exploration in quantum space may be random, or non-random. As covered earlier under the double slit experiment, an aspect of quantum reality is that these processes can't be directly perceived since perception causes them to become non-quantum. Therefore, the question of random vs. non-random may be impossible to determine one way or the other. (This fact allows Brown University biologist Ken Miller [1999], devout Catholic and Intelligent Design debunker mentioned earlier in relation to the evolution of nylon-eating bacteria, to tuck God into quantum space, behind the "Planck Curtain," so to speak.) If it is random, then this exploration is more-or-less neo-Darwinian, only transposed from classical to a quantum reality. As Dawkins says, "mutation is not systematically biased in the direction of adaptive improvement" (1986, p. 308). So likewise here in a random exploration within quantum space (i.e., if the exploration is random). Besides the (hypothesized) fact that this process is happening in quantum vs. classical space, the other difference is that, while under the MES the sorting out is done via natural selection (which, of course, has no applicability to the pre-biotic world of molecules) here it is done via entanglement of a "virtual" (quantum) molecule and classical reality in which a precipitated version of that molecule conforms to an energy minimum. This is basically the same process McFadden covers in his description of how quantum versions of gene mutations become entangled with classical reality once the corresponding classical version becomes capable of replication.

Once this crystallization happens, other identical molecules “tune in” to this solution and begin to crystallize in the same way (Sheldrake). And the more it happens, the more it happens, until they all crystallize similarly. Thus the atomic properties of a molecule do not constitute all the information contained in (or perhaps around) it. A molecule that has “learned” to crystallize is different than an atomically identical molecule that has not. Where that information resides is a question for which I don’t provide a hypothesis other than to surmise that it presumably must be in some kind of partially non-local quantum space. Actually this is not-dissimilar to the standard notion (beloved most especially by mathematicians and theoretical physicists) that the laws of nature reside in a kind of “Platonic” realm, so that they were in place from the “git go” 14 billion years ago. (Sheldrake explores this in *The Presence of the Past*, in which he speculates that perhaps the laws of the universe could more accurately be termed “habits” of the universe. I don’t know. Of course, if they are habits, they must be formed according to some laws, so we can’t escape more or less Platonic law altogether.)

Moving to the other end of the evolutionary scale, to *homo sapiens*, the same process is also at work but, as with molecules crystallizing, again largely not genetically (although neo-Darwinism remains in place). People learn a skill, say taking intelligence tests. Of course, there are no appreciable genetic changes from one generation to the next, and yet people get better and better at taking these tests (Shermer, mentioned earlier). Are they getting smarter? Unlikely. More likely they are altering the energy fields permeating their heads so they can perform these tests better. When one person does it, that makes it easier for the next to do so. If a million people learn to do calculus, or to skateboard, or to operate a computer, or whatever, this makes it that much easier for the millionth and first person to accomplish the same task (Sheldrake). This may represent post-genetic evolution (although non-genetic evolution may be a better term since it is shared with, e.g., pre-biotic molecules).

The End

Likewise with *satori* experiences of “at oneness” with the universe. The more people have them, the more people have them. Of course these, like all experiences, come and go. But they also leave a residue. After such an experience things are not quite the same. The idea that we all share the same consciousness in our deepest interior ceases to be ridiculous and starts to seem like a perfectly reasonable concept. The idea that life after the death of the body is like another country vaguely sensed beyond the broad horizon of the earth seems at least plausible, if not really explicable. As does the concept that one could be a conduit for healing of another, drawing on the energies of the universe, the conscious universe, the conscious, loving universe. Infinite negentropy somewhere. In one’s deepest soul. It’s a thought that remains, sometimes in the form of a sketch for a New Model of Evolution.

Well, there it is. Like any sketch, this one is a little rough. After all it *is* a sketch, not a fully formed picture. But I intend to start work on the picture in due course, having bought a canvas and the oil paints, and having moved these into the drawing room. In the meantime, if any readers find egregious errors in fact or logic in what was presented here, I would appreciate having these pointed out to me since I want to paint the subject as accurately as I can, “warts and all.”

"I want to know God's thoughts; the rest are details." – Albert Einstein

"You can explain things for people, but you can't understand for them." – Felix Rohatyn

"Science progresses one death at a time." – Niels Bohr

References

- Behe, M. (2007). *The edge of evolution*. New York: Simon & Shuster.
- Beyond Belief: Science, Reason, Religion and Survival. (2006). Retrieved April 15, 2009 from <http://thesciencenetwork.org/programs/beyond-belief-science-religion-reason-and-survival>
- Castell, A. (1963). *An introduction to modern philosophy in seven philosophical problems*. New York: Collier-Macmillan. [R.G. Collingwood, pp. 248-257].
- Cramer, J. (2006). Going for a blast into the real past: If the experiment works, a signal could be received *before* it's sent. *Seattlepi.com*. Interviewed by T. Paulson. Retrieved on April 15, 2009 from http://seattlepi.nwsource.com/local/292378_timeguy15.html.
- Crick, F. (1994). *The astounding hypothesis*. New York: Touchstone.
- Darwin, C. (1964). *On the origin of species by means of natural selection*. (Originally published 1859). Cambridge, MA: Harvard University Press.
- Darwin, C. (2004). *The descent of man*. (Originally published 1871). Oxford: Penguin.
- Davies, P. (2007). *Cosmic jackpot* (published later as *The Goldilocks Enigma*). New York: Houghton Mifflin.
- Dawkins, R. (1986). *The blind watchmaker*. New York: W.W Norton.
- Dawkins, R. (1996). *The blind watchmaker*. New York: W.W Norton.
- Dawkins, R. (2006). *The god delusion*. New York: Houghton Mifflin.
- Dennett, D. (1995). *Darwin's dangerous idea*. New York: Simon & Shuster.
- Feynman, R. (2009). *Richard Feynman*. Retrieved April 15, 2009 from http://en.wikiquote.org/wiki/Richard_Feynman
- Fiddler on the Roof Script Dialogue Transcript. (2009). Retrieved April 15, 2009 from http://www.script-o-rama.com/movie_scripts/f/fiddler-on-the-roof-script.html
- Goswami, A. (2008). *Creative evolution*. Wheaton, Illinois: Quest.
- Goswami, A. (1993). *The self-aware universe*. New York: Penguin Putnam.
- Hameroff, S. (2009). *"Funda-Mentality" is the conscious mind subtly linked to a basic level of the universe?* Retrieved April 15, 2009 from <http://www.quantumconsciousness.org/penrose-hameroff/fundamentality.html>
- Harris, S. (2004). *The end of faith*. New York: W. W. Norton.
- Hill, M. (2000). Adaptive state of mammalian cells and its nonseparability suggestive of quantum system. *Scripta Medica*, 73 (4): 211-222.
- Jahn, R. & Dunne, B. (1987). *Margins of Reality*. Princeton: ICRL Press.
- Jeans, J. (2009). *Quotation: The universe*. Retrieved April 15, 2009 from <http://www.britannica.com/EBchecked/topic/302187/Sir-James-Jeans/302187suppinfo/Supplemental-Information>
- Kauffman, S. (2000). *Investigations*. Oxford: Oxford University Press.
- Kauffman, S. (2008). *Reinventing the sacred: A new view of science, reason, and religion*. New York: Perseus
- Koestler, A. (1968). *The ghost in the machine*. New York: McMillan

- Kuhn, T. (1996). *The structure of scientific revolutions*. Chicago: The University of Chicago Press.
- McFadden, J. (2000). *Quantum evolution*. New York: W.W. Norton.
- McTaggart, L. (2002). *The field*. New York: Harper Collins.
- Miller, K. (1999). *Finding Darwin's God*. New York: Harper Collins.
- Miller, K. (2008). *Only a theory*. New York: Viking.
- Milton, R. (1997). *Shattering the myths of Darwinism*. Rochester, Vermont: Park Street Press.
- Penrose, R. (1989). *The emperor's new mind*. Oxford: Oxford University Press.
- Planck, M. (1944). *Das Wesen der Materie* (The Nature of Matter), speech at Florence, Italy, 1944 (from Archiv zur Geschichte der Max-Planck-Gesellschaft, Abt. Va, Rep. 11 Planck, Nr. 1797). Retrieved April 15, 2009 from http://en.wikiquote.org/wiki/Max_Planck
- Popper, K. (2009). *Karl Popper*. Retrieved April 15, 2009 from http://en.wikipedia.org/wiki/Karl_Popper
- Red Orbit. (2005). *Can this black box see into the future?* [Random Event Generators experiment]. Retrieved on April 15, 2009 from <http://www.redorbit.com/news/display/?id=126649>
- Richard, M. & Thuan, T. (2001). *The quantum and the lotus*. New York: Random House.
- Radin, D. (1997). *The conscious universe*. New York: Harper Collins.
- Radin, D. (2006). *Entangled minds*. New York: Simon & Shuster.
- Rees, M. (1999). *Just six numbers: The deep forces that shape the universe*. New York: Basic Books.
- Sheldrake, R. (1981). *A new science of life*. Rochester, VT: Park Street Press.
- Sheldrake, R. (1988). *The presence of the past*. Rochester, VT: Park Street Press.
- Sheldrake, R. (1999). *Dogs that know when their owners are coming home, and other unexplained powers of animals*. New York: Random House.
- Sheldrake, R. (2009). *A new science of life*. Rochester, VT: Park Street Press.
- Targ, R., (2008). *Do you see what I see?* Charlottesville, VA: Hampton Roads
- Thompson, E. (2007). *Mind in life*. Cambridge, MA: Harvard University Press.
- Wilber, K. (1995). *Sex, ecology, spirituality*. Boston: Shambala.

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A Leadership Journey: Personal Reflections from the School of Hard Knocks

R. Scott Pochron

Abstract: The following paper chronicles the evolution of the author's thinking on leadership through the course of his work experience. Leadership is viewed as a dynamical process involving both formal and informal roles. The process is initiated as an individual identifies opportunities and feels pulled to respond to emerging patterns and initiate action to enable positive change. The dynamics between formal and informal leadership structures and leadership as a state of mind are discussed.

Key words: Adversity, complexity, fundamental state of leadership, leadership, requisite organization, self transcending construction.

The following paper presents a reflection on my personal journey and evolving understanding of leadership based on my work experience over the past 17 years. As I look back on the time, I recognize that much of my current interest in leadership and complexity has evolved from crises that have I have confronted and attempted to overcome. This paper chronicles the development of my thinking on leadership.

Stages in the Journey

Through my career I have seen various touch points that have shaped and influenced my perspectives on leadership. Fundamentally I have experienced my role as a leader as one who articulates and puts into action a vision for a future that inspires others to join in ... at least to a point. Frequently along the way it has been the disequilibrium of resistance to that vision that has been the greatest influence on reshaping my focus and thinking about leadership, as I've struggled to overcome obstacles. I have come to see leadership as a dynamical distributed process among actors.

There are some fundamental principles that have driven my beliefs about leadership as a process. In this regard, I believe I have adopted an informal methodology akin to grounded theory, as I take in information about an area of concern, formulate a theory about how to address it and then test and modify that theory through active engagement. Frequently I have found that additional learning (through books read on the subject of inquiry) have supplemented the theorizing process, and not inconsistent with grounded theory methodology where review of the literature often occurs after initial data and theorizing has started (McGhee et al. 2007).

There have been peak events through my career that have shaped my perspectives on leadership. However, the past eight years working for a large multinational company have served as the informal laboratory for the development of my thinking that has lead to my current graduate studies in Leadership Dynamics.

I recall the bittersweet excitement of joining the company. I had been employed as CIO for a smaller publicly traded company that was subsequently acquired by the larger multinational company (about 60,000 employees globally). I had worked through the emotional transition as operations were shut down and transferred to new corporate headquarters. Of the 150 employees in the company, only about 10 of us were offered permanent positions and relocated.¹

My new position in the acquiring company was, in my opinion, a dream job – devising a long-term strategy for the growth of a key business unit from a process and technology perspective. I quickly noted operational problems and developed recommendations to address them. However, my dream was quickly shattered as I soon realized that what I was hired to do and the willingness of the management team to embrace new ideas were not necessarily aligned. Over the past eight years, I have watched as the company has grown substantially – largely through acquisition – and yet somehow continued to suffer from the same challenges I noted when I first joined.

Organization as Organism

My first day at work with the new company, I was struck by the tyranny of meetings that absorbed so much time there was no time left to do work. Employees were frustrated because they did not have access to their managers for direction. Projects were not being completed in a timely manner because the subject matter experts needed on them were double or triple booked and unavailable. Organizational beliefs about collaboration required all key employees that were stakeholders to a project participate in discussion and decision making. Yet, decision making was an extremely slow process as there was no clarity (with the exception of a handful of senior executives) as to who had decision making authority. Very often a meeting would be called to make a decision. A group would gather and discuss the issue, but because one key person was not present (double booked in another meeting!) the decision could not be finalized. So another meeting would be called and on and on it went as a never ending caucus-race.

While I was brought into a company as a change agent and explicitly tasked to bring strategic change to the business unit to which I was assigned, I quickly realized that this was not truly the case. Interest in change was driven solely by the immediate short term demands of specific clients, executives or what did not significantly impact the status quo. At this time I managed a team responsible for coordinating technology related projects for the business unit; I also reported to the Executive Vice President of the business unit. At one point I had a lengthy conversation with him about problems in the way we were working with the larger IT department. That conversation ultimately resulted in a reorganization in which a new VP of IT was brought in, the team that reported to me was passed on to someone else, and I was to report to this new boss as an independent contributor.

This transition was an extremely difficult period for me, yet significant in shaping my views of leadership. First, I went through a season of deep self searching as I worked through the shift from manager to independent contributor. This was a period of deep reflection on my sense of identity, my values, and sense of personal integrity. I interpreted this transition as the system

¹ I will speak more about what I learned from this difficult transition in a later section.

self-organizing and engaging a new way of addressing IT within the business unit (a significant process improvement), however the reorganization left me in a shadow role to what I was originally tasked to do. A new major acquisition had just been signed and the focus of the whole company had shifted from future strategy to short term integration. After about six months in this position, I moved out of the business unit to work in a new role within the larger parent company.

Leadership is largely about exerting influence in a manner that encourages others to follow to a desired outcome. Various authors have come up with definitions along the way. My favorite remains Sun Tzu in the *Art of War*: “The way [of leadership] means inducing the people to have the same aim as the leadership, so that they will share death and share life, without fear of danger” (Sun Tzu, 2005, p.43). For Sun Tzu, leadership was about strategy, relationships, and a dynamic that aligned a shared vision that might also call on those so aligned to take action that may transcend personal self interest; the definition also recognizes the collaborative dynamic that leader and follower share in participating in this vision – both share the benefits and risks in its pursuit.

Understanding this inner dynamic of shared vision was also consistent with other schools of thought that I had aligned with. Senge’s works (1990; 1994; 1999) on learning organization theory reinforced the need for personal mastery, defined as an openness to question one’s own perspectives – the mental models that frame one’s understanding of how the world works as a starting point for learning. Additionally, Senge’s work introduced me to systems thinking and understanding the integrated wholeness of organizations. This perspective was reinforced by my studies of Neurolinguistic Programming and Neuro-Semantics, which provided a rich model of understanding human communications and the way in which we construct our mental maps of the territory. A key learning for me was the principle that “the person with the most flexibility exercises the most influence on the system” (Bodenhamer and Hall 1999, p. 81). This principle reinforced the importance of self mastery, driving the point that the person who exercises the greatest mastery over their own behavior and attitudes is able to exercise the most influence with others. Quinn (2000) also supported this notion by emphasizing that transformational change occurs when we choose to change ourselves – often by choosing behavior that is self sacrificing in nature. I made the commitment to learn to be the difference I want to see in the world, and develop my personal flexibility within the corporate system.

I found this conscious decision to be freeing and challenging at the same time. Freeing in that I found myself liberated from a sense of self that derived value from titles, and power roles (I realized in my changing role, that I had part of my self-identity in the work context was tied to having employee relationships). This commitment was also challenging as I began to explore the process of leadership outside the mainstream hierarchical power structure that could mandate action through positional authority. As an independent contributor I found myself free to lead in a variety of ways, emphasizing the importance of influence in the contexts that I was called to serve in.

I also mentally stepped back from the situation and began to look at the business, its internal and external stakeholders, and the parent corporation as an interwoven system of relationships that in many ways behaved as a living organism. From time to time I would go out to a hill on

the property that overlooked the corporate offices. I would envision the ebb and flow of people as they moved about their work, the processes of various departments that enabled this organism to be successful. I also realized that it was a lack of attentiveness to the signs of *dis-ease* in the organization that most often resulted in a flurry of activity when minor symptoms evolved into major problems. I recognized that an aspect of leadership is to discern this ebb and flow of the organization and identify the systemic pain points proactively – early enough so that adequate time is available to resolve the pain points *before* they become serious.

The challenge I noted was that pain measures the threshold for attention in light of competing demands. Very often key issues remain untouched solely because the situations have not reached the pain point necessary to capture adequate attention. Part of this appeared to be an issue of prioritization; part an issue of prevailing beliefs (operating as a perceptual filter) within the culture that influence what employees attend to. Busyness and firefighting were perceived as good customer service and rewarded, rather than finding ways to proactively reduce the impact to effectiveness and efficiency of employees and the customer experience through better process. In this I recognized that assessing *organizational readiness* – the ability to see and overcome limiting beliefs to engage in self-transcending construction² – was a critical skill of leadership. The leader who can recognize the thresholds of organizational readiness is able to proactively choose when or when not to act for best advantage. It is not enough for a leader to take action; the leader must also discern when to take action so that the influence will have best effect.

Leadership as Enacting an Emerging Future

A core belief I have held about leadership is that the leader is one who sees a potential future and sets in motion actions that move those involved toward that vision. Over the years I have found that my time horizon (based on the work I was tasked to do) has provided a fairly accurate view of emerging future 3-5 years out, and I have felt a strong pull to take action as a means of preparation for meeting that future vision. Frequently that takes the form of recognizing the gaps between the resources required to operate in that future state and actions needed to close the gap. The leadership challenge comes in being able to express this vision when others may not have the capability to think that far out into the future or agree to what that future should be and what it will take to create it.

Graduate studies have expanded my understanding of this dynamic through the lens of adult development and Jaques's model of Requisite Organization (2004). Post formal adult development focuses on the capability of an individual to conceptually embrace complexity. There are many models for this type of development and for purposes of this paper I am limiting myself to Jaques's articulation of mental capacity. Jaques noted that mental capacity for complexity correlated with one's ability to complete work n-years into the future; the longer the duration of the task assigned the greater the complexity of the work and mental processing required to complete it. The leadership process then needs to account for contextualizing that future vision in time spans that have relevance to each person in the organization. This is not just

² Self transcending construction is a term proposed by Goldstein (2008) as a preferred description for emergent phenomena within human organizations. Emergent behavior essentially provides an opportunity for a developmental shift in ways of thinking, being and acting within a specific context.

a senior executive speaking about corporate vision. According to Jaques, aligning individual contribution to shared vision is a leadership practice that each manager is accountable for. In this regard, shared vision is a distributed process that occurs at all levels of the organization, which then is able to align individual action with short and long-term goals.

Disequilibrium

Disequilibrium is an important state in the dynamics of an organization; it is the point at which the possibility for self transcending construction of novel approaches to specific challenges is most likely to occur. It is in the pressures associated with disequilibrium that the pain thresholds reach a critical point that opens an organization to be more receptive to emerging possibilities. Yet there is a difference in the role that leadership plays in such states. In a catastrophic situation (such as the transition period when business operations were shut down as previously described), the immediate role of leadership is to make sense of the situation and address the emotional unraveling in morale. I was one of the senior leaders called upon to speak to the employees immediately after the announcement that the company was to be closed. After months of talk of the positive benefits of the merger, one hundred and fifty people were essentially told that they were losing their jobs – a third of them, that very day! I invited everyone to come together into a tight circle, acknowledged that there had been a death in the family but now we knew where we all stood. I also was able to pass out a booklet to each employee on dealing with consequences of a merger. I had arranged for these booklets without knowledge of what the outcome of the merger would bring. In discussions with employees after that meeting, I received validation for the value of the discussion in bringing a shared sense of acceptance to the reality we faced; they also commented that the booklet brought a tangible sense of being cared for in the process.

There is a paradoxical dynamic to disequilibrium states. Frequently it is the acute sense of pain experienced during these states that invites an openness to change and new ways of seeing that enable self-transcending construction. A disequilibrium state can also have the converse effect resulting in a resistance to change. In my experience, the challenge of leadership is the ability to proactively anticipate and influence change *before* the disequilibrium state becomes acute. My own sense of ambiguity served as a motivator to purchase the “merger transition” booklets prior to the finalization of the merger (I had intuited that the outcome may not be as favorable as had originally been voiced by management). Since organizations operate as complex adaptive systems, the dynamics that lead to disequilibrium typically exist as symptoms which can be observed and responded to long before the problem becomes critical. In this regard, the process of (proactive) leadership has a self regulating effect in the organization by enabling the process of self-transcending construction.

Leadership as a Process

Through my experiences I continue to see leadership as an ongoing process that occurs in human organizations through the interplay of formal and informal relationships. Leadership as a process is embodied by actors who choose to respond to a situation. Formally, the leadership process is exercised through hierarchical structures of management. While the function of management is different from that of leadership, I ascribe to the principle espoused by Jaques

that management is accountable for leadership practices to align their subordinates with the vision of the enterprise.³ Jaques's Management Accountability Hierarchy (MAH) is also structured to account for adult developmental factors – a manager is developmentally one stratum (as defined by ability to deal with work of a specific level of complexity) higher than their subordinates. Consequently, the manager should be able to bring more complex thinking to problems that a subordinate may face, and in so doing bring value to understanding the work. Likewise, the subordinate is accountable for sharing insights about the work with his/her manager who can pass on trends and insights further up the ladder. Jaques's model for administrative leadership through the formal hierarchy of management creates a bidirectional feedback loop that maintains good intelligence moving through the organization. This operates as the core nervous system and means by which work and decisions flow through the organization. Put succinctly, *effective* leadership is directly impacted by the organizational structure of the enterprise and the ability of the system to coordinate the developmental capabilities of employees into their work and communications flow. This has been a great awakening for me. Whatever skills I may have in enacting leadership may be compromised by ineffective structure in the system as a whole. In fact, I attribute the lack of a requisite organizational structure as one if not the major impediments to organizational ineffectiveness within my prior work environment.

Leadership as a State of Mind

Lastly, I have come to see leadership as a state of mind. This draws initially from the work of Robert Quinn (2004), which suggests that there are certain states that serve as attractors for the actor to take action that would be viewed as leadership in a given context. The Fundamental State of Leadership (FSL) creates the internal context that inspires the actor to respond and is reflected in four interrelated attitudes, which Quinn contrasts with opposing attitudes reflecting the “normal state.” These are summarized in Table 1 below:

Table 1: Comparison of Normal State and Fundamental State of Leadership

Normal State	Fundamental State of Leadership (FSL)
Comfort-Centered: Desire to maintain equilibrium and consistency in life experience.	Purpose-Centered: Alignment with a purpose greater than self. Willingness to face challenges – to move outside one's comfort zone – in order to achieve the desired outcome.
Internally Closed: Self-preservation sets strong boundaries to external influences that would disrupt internal equilibrium	Externally Open: Takes on an attitude of curiosity and exploration in discovering what lies outside the comfort zone. Interprets experience as feedback to better align with purpose.
Self-Focused: Ego driven, puts self interest before the interests of others in a given context	Other-Focused: Willing to set aside personal needs for the sake of accomplishing the desired outcome and betterment of others before self
Externally Directed: Sensitive to the impressions of others; will conform behavior in order to ensure acceptance	Internally Directed: Personal accountability to be integrally aligned with purpose; self-confident and willing to act regardless of the opinions of others

Source: Adapted from Quinn, 2004, p.18-25.

³ Jaques defines 10 distinct leadership practices.

There are several implications to this model. First, that leadership has less to do with formal position and more to openness to the internal attractors that dispose the actor to perceive and respond to emerging phenomenon.⁴

The FSL serves two functions: first by creating an attractor that encourages active behavior that serves the greater good of the organization. Second it opens the actor to be more consciously aware of his/her perceptions and patterns of behavior. In this, the FSL represents a framework of attitudes that encourage post formal thinking – a more self-directed attitude.

I have seen this played out in my own experience. In the first three years of my tenure with my employer, I was very aware of the need for a Customer Relationship Management (CRM) system to better serve the organization and needs of its customers. My recommendation met substantial resistance with management as a prior attempt to put in a CRM system had been unsuccessful.⁵ I was persistent in expressing this need – to the point that my manager told me that if I brought it up again I would be excluded from management meetings. And then the day came when he wanted a current client list and discovered that our current systems could not produce an accurate list. Suddenly putting in a new system became a priority... three years after the original recommendation. In a similar vein, as I transitioned to a role in the parent company, I conducted research, which led me to an awareness of the value of e-business and relevance for the ongoing growth of the company. I became a passionate advocate of e-business and presented numerous proposals to senior executives. My recommendations were not embraced, largely because senior executives did not believe that it was a viable tool within the industry. Ironically, 6 years later there is renewed interest in expanding e-business for the company.

These experiences reinforced for me a primary principle that the process of leadership is initiated as an actor (regardless of formal or informal authority) recognizes a particular need and chooses to take action, even in the face of obstacles. This reflects an alignment with the core attitudes described in the FSL.

I close with a case study where I consciously experienced the FSL in exercising leadership. I participated in a voluntary cross-functional team seeking to improve employee work experience. With gas prices on the rise, there was a strong interest in developing a strategy for telecommuting. Several solutions were suggested and were immediately shot down by the representative from IT as either being too costly, too time consuming for IT staff, or too risky from a company security perspective.⁶ During the conversation I was struck by the possibility of

⁴ I do not dismiss the importance and significance of formal leadership structures; rather I am noting that leadership fundamentally operates as an internal response to attractors that enable self transcending construction as a response to a perceived reality. Within organizations, the interplay of actors taking action to lead in formal or informal capacities is dynamic and complex and beyond the scope of this discussion.

⁵ Customer Relationship Management systems typically require a high level of coordination and voluntary participation of employees to be successful. Historically, a high failure rate has typically been associated to implementation of these systems in the industry.

⁶ Note that this description is not intended to reflect negatively on the behavior of the IT representative. As an individual caught in the webs of larger meaning – coordination of the myriad of service requests from multiple functional departments with limited resources in staff and dollars can instill a mindset that

using a specific technology that had not been discussed. In spite of obvious resistance from IT to offer a solution, I chose to do my own research⁷ and discovered that a technology that had been discussed seemed to offer a reasonable compromise on low cost, minimal IT support, and strong enterprise security. I went back to the committee with a proposal to pursue this option. I then went through a series of “gauntlets” to get the software approved for testing by IT, engaging in a pilot (which proved highly successful), and then working with IT and HR to define a process for rolling out the program.

Several things struck me as I experienced myself going through this process. I felt “pulled” to conduct the research, and also made a *conscious* decision to prepare the proposal and push this through to completion, in spite of recognized resistance from some of the IT resources. This was not a project that was part of my normal work assignment, and I could have let go of the idea. Yet the inner states that focused on serving the greater good, and seeing the opportunity that this solution could provide served as an attractor to persevere through the resistance and ultimately lead to a successful result. Had I chosen to stay within my comfort zone, the new process and organizational dynamics would not have emerged.

I’ve touched on a number of aspects of the leadership process, which I have gleaned through my work experience. In summary, I have come to see leadership as a dynamic process that occurs in human organizations as actors perceive emerging possibilities and choose to take action. The willingness to do so is strongly connected to the actor’s internal states, and engagement of the Fundamental State of Leadership. Finally, the effectiveness of the actor may be impacted by the actor’s sphere of influence and by his/her formal or informal status and authority to act, and organizational readiness to embrace the change. I look forward to further develop these understandings as I continue my graduate studies.

References

- Bodenhamer, B. G., & Hall, L. M. (1999). *The User's Manual for the Brain* (Vol. 1, p. 422). UK: Crown House Publishing.
- Goldstein, J. A. (2007). A New Model of Emergence and its Leadership Implications. In *Complex Systems Leadership Theory, Exploring Organizational Complexity* (Vol. 1). Mansfield, MA: ISCE Publishing.
- Jaques, E. (1989). *Requisite Organization: A Total System for Effective Managerial Organization and Managerial Leadership for the 21st Century : Amended* (2nd ed., p. 288). Baltimore: Cason Hall & Co Pub.
- McGhee, G., Marland, G. R., & Atkinson, J. (2007). Grounded theory research: literature reviewing and reflexivity. *Journal of Advanced Nursing*, 60(3), 334-342. doi: 10.1111/j.1365-2648.2007.04436.x.

favors self-preservation rather than innovation. Part of the leadership journey is recognizing the frame of reference from which others are operating, and learning to work with those frames.

⁷ Note that choosing to do that research was not overstepping lines of authority. In my role at that time, I was heavily involved in developing strategies that involved technology solutions from the business side. I coordinated those projects with IT resources for implementation.

- Quinn, R. E. (2004). *Building the Bridge As You Walk On It: A Guide for Leading Change*. San Francisco: Jossey-Bass.
- Quinn, R. E., Spreitzer, G. M., & Brown, M. V. (2000). Changing Others Through Changing Ourselves. *Journal of Management Inquiry*, 9(2), 147. doi: Article.
- Senge, P. M. (1990). *The Fifth Discipline: The Art & Practice of the Learning Organization* (1st ed., p. 345). New York: Doubleday Business.
- Senge, P. M., Kleiner, A., Roberts, C., Ross, R., & Smith, B. (1994). *The Fifth Discipline Fieldbook* (1st ed., p. 608). New York: Doubleday Business.
- Senge, P. M., Kleiner, A., Roberts, C., Roth, G., Ross, R., & Smith, B. (1999). *The Dance of Change: The Challenges to Sustaining Momentum in Learning Organizations* (1st ed., p. 224). New York: Doubleday Business.
- Tzu, S. (2005). Trans. Cleary, T. *The Art of War* (p. 224). Boston: Shambhala.

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Creativity and Transdisciplinarity: An Interview with Alfonso Montuori

Russ Volckmann

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—Russ Volckmann

Russ: Alfonso Montuori, it is a real pleasure to talk with you. I've had a chance to think a bit about your life and your work, and one of the very first things that struck me was the fact that you are Italian and you hardly ever lived in Italy. What was that about?

Alfonso: My father was a diplomat for the Italian government. He married my mother when they were in Portugal, and my dad then was transferred to Holland. Coincidentally, my mother is Dutch. I was born in Holland, and lived in Lebanon, Greece, and England, before I came to the US. Despite the fact that I had an Italian passport, I never lived in Italy. I didn't live in the country that issued one of my passports until 2007, when I became a dual U.S. citizen.

Russ: It's really quite extraordinary, the impact of that kind of lifestyle on individuals. I'm an Army brat myself, so I lived many different places. I found you lived in the U.K. for a time. I got the impression that you were involved in music while you were there—is that correct?

Alfonso: Absolutely. I played saxophone professionally in a number of bands for five years or so.

Russ: Would you describe yourself as more like Coltrane or Desmond?

Alfonso: (laughs) Well, I loved both of them, and I was always very much influenced by jazz, but I didn't really play jazz. That was an interesting time in London in the mid- to late-70's when the stranglehold of the big record companies was broken. Young bands always had the Catch-22 of needing a record deal to get a gig and needing a gig to get a record deal. That all broke down around then with the punk revolution. That also coincided with everyone and their dog creating independent record labels and putting out their own music, which is what I ended up doing. After playing in a number of different bands, I created Banana Records when I put together my own band. Initially the band was more of

a joke than anything else. It was really just an excuse for friends who were in different bands to get together and play wacky music we didn't think other people would like too much. But of course that happened to be the most successful band of the lot. We did a lot of really great gigs, we toured, recorded a radio show for the BBC, made some recordings that were well received, had a good agent and a good time. That was a nice stretch of time for me there.

Russ: How would you describe the style of music you were playing if it wasn't jazz?

Alfonso: That's an interesting question. When we started getting more successful and getting the attention of major record companies who wanted to sign us, they kept saying, "You obviously have a lot of fans, and we like the way you sound, and we like what you do, but we don't know what bin to put you in, in the record stores." This was in the day when there were still record stores and people would browse under different categories. They didn't know what to call us—rock, funk, jazz, comedy—we were a pretty crazy band. We crossed musical genres and that confused the hell out of them. We would do all kinds of stuff—we'd start every set by playing the theme from "Hawaii 5-0." From there, we'd go in any number of different directions and have a smattering of jazz, soul, bizarre tunes we'd write. We were like a psychedelic world-beat band—but not really!

Russ: So you'd start with one of the favorite tunes for surf bands and then move into the rest of the world. (laughter)

Alfonso: Exactly, and we had drums, bass, percussion, keyboard, guitar, trumpet, sax—we pulled it off.

Russ: Does this diversity of taste that you seem to have had in any way predict directions that you moved in when you left music?

Alfonso: Absolutely. For me, it's all autobiographical. All of the things that I'm looking at now in terms of creativity, transdisciplinarity and so on have their roots in my own experience. Things like people asking simple questions, such as, "Where are you from?" That always involved a story. I could never just say, "I'm from San Francisco." I'm not. It made me reflect on issues of identity. Sometimes I would just say, "I'm Italian," because I didn't have the energy to go into a spiel, or I'd brush it off by saying, "I'm from downtown Europe." But it felt more complex and anyway, saying I was Italian without actually having lived there felt somehow dishonest. So that definitely had an impact for me, because I believe that ultimately this complexity and diversity exists in every one of us, in different ways. It's just that for me the diverse cultural background made it more evident—it was a more glaring manifestation. It triggered a lot of my current interests. Categorization, disciplines, and narrow labeling inevitably mutilate the complexity of a human's life...

Russ: And constrain the creative potential that's there as well.

Alfonso: Exactly right! So I was also very interested in things like prejudice, racism and stereotyping, which all tied back to some of the work of people like Krishnamurti and the spiritual traditions that argued strongly against a tendency to label, categorize and think that we have these nice, ready-made understandings of what the world is really about. To me it was always far more complex and mysterious. No label or set of labels could do life justice. We live with this illusion that we know what's going on—maybe not cosmically, but at least in terms of everyday things, events, and interactions—but nothing could be further from the truth. I don't think we have a clue about anything. We just live with this delusion of familiarity.

Russ: I know you did your dissertation at Saybrook with Béla Bánáthy and others. How did you move from the world of jazz into working on a Ph.D. there?

Alfonso: I was in London in 1983 and I'd completed my B.A. at the University of London. Then the band broke up, as bands will; some friendships were broken. They've since been healed, but I was ready to get out. I didn't really feel any deep roots in England. England itself was going through a depression at that point, and there was a resurgence of nationalism. The Falklands War was going on at that time. There were right-wing racist movements like the British Movement and the National Front. I was always fascinated by California. The kind of people that I was interested in always seemed to come out of California, along with the music I was interested in, the writers that I liked, and so on. I decided to go check it out—surely the weather had to be better, and the food couldn't be any worse.

Russ: (laughter) And in that process you found Saybrook.

Alfonso: Yes. Initially I found the Monterey Institute of International Studies where I got my degree in International Relations. I had no idea what I was doing when I left London. I just went to an office on Baker Street in London and looked for a few universities that seemed to be in California. For some reason I thought I would do international relations—maybe because it was related to my experience living in different countries—I can't quite remember what my rationale was. I got a number of catalogs including one from San José State—I had no idea where San José was—and one from Berkeley that emphasized the difficulty in getting housing—and one from the Monterey Institute that had nice pictures of beaches and talked about the local seafood.

(laughter)

And I thought, "That sounds like the place for me!"

Russ: Well I don't blame you. It's part of the reason I live here.

Alfonso: Exactly! It was a beautifully soft landing. Monterey in 1983 was still a pretty boring and sleepy little town. So, in a sense it was perfect for me because there were no distractions. Actually, I thought there would be jazz—I didn't realize that jazz was only in Monterey three days out of the year for the Jazz Festival—so there wasn't any music

worth talking about. I suddenly found that I had fallen in love with research and writing. The world of ideas had always been my other love. My father was a well-respected philosopher, as well as a diplomat. He wrote extensively on the Socratic problem, and my maternal grandfather, who was the CEO of a multi-national, had an amazing library with really interesting and diverse material—Jung, Fromm, all sorts of philosophy from Plato to Bergson to Heidegger, economics, Yeats, Joyce, Henri Miller, and much more. I spent hours browsing. I was always buying tons of books and records—and it just turned out that after all that music, I now enjoyed playing with ideas a lot. I got my M.A. and then went to China to teach for a year, because I realized I didn't know anything about China. I taught at the Central South University in Changsha in Hunan Province, and that was a remarkable experience. I went back there for a conference on the work of Edgar Morin, and of course the changes from 1985 to 2005 were mind-boggling...

Russ: *Fascinating.*

Alfonso: I came back from China and looked for a Ph.D. program. Again, this is one of the things that was very motivating for me later on—I talked with a lot of different people about my interests. People in psychology said, “Well, you should be in sociology,” Sociologists said, “Well, you should be in political science.” Political science folks said, “You know, this sounds more like philosophy,” and the philosophy people would say, “Try anthropology.” The anthropologists would send me back to psychology.

(laughter)

It didn't make any sense! Really, I wanted to work with Frank Barron at UC Santa Cruz. Frank was one of the major creativity researchers, but he warned me that UCSC would frown on my disciplinary promiscuity, so I had to look elsewhere. Before I met Frank I had no idea that there even was such a thing as creativity research out there. I only came across Frank's work because I was interested in the CIA's experiments with LSD. I had written a paper on it in Monterey and I knew that Frank knew about this frankly shocking “research.” Not that he was personally involved, but he was one of the people that played a considerable role in the psychedelic movement in the U.S., if only because he's the man who turned Tim Leary on. Frank was really serious about the potential and also about the dangers of psychedelics, and traced his roots back in the U.S. at Harvard, at least, to William James. He was actually thoughtful about the relationship of psychedelics to creativity and the evolution of consciousness.

Russ: *Did creativity play a role in your choice of dissertation?*

Alfonso: It was absolutely central. My interest in creativity did not come from my musical experiences, initially. I had read Adorno's, Levinson's, Frankel-Brunswik's and Sanford's *Authoritarian Personality* in Monterey because of my interest in racism and prejudice. Then I came across Frank Barron's work. He had done a lot of the key work at the Institute of Personality Assessment and Research at Berkeley on articulating the characteristics of the creative person. I put the creative person and the authoritarian person side-by-side and I saw that they were practically opposites. The authoritarian

person would score high on intolerance of ambiguity; the creative person scored high on tolerance for ambiguity. The authoritarian person scored high on conformity; the creative person scored high on independence of judgment, and so on.

That was fascinating to me. I started to think about creativity not as something that's just confined to the arts and sciences, but as a way of being in the world. I started looking at educating for creativity as a way of educating for life in a complex, pluralistic, uncertain world. It seemed to me that creativity gave people the ability to respond to unforeseen situations, different situations and different kinds of people in a more creative and constructive kind of way. An authoritarian person would want to control or eliminate differences and surprises.

My experience with music and specifically with improvisation was very useful there, because it seemed to me the ability to improvise—to deal with the unforeseen, the unexpected, and in fact to generate it—was becoming essential for what the sociologist Zygmunt Bauman calls “Liquid Life.” In the industrial, mechanical worldview of modernity we were educating for a “solid,” predictable, homogeneous factory life where everybody's part in life, in the social order, was pretty much established. Improvising there meant having to make something up because the “one right way” couldn't be followed for whatever reason—it was essentially a response to a mistake, and, second best, born of necessity. But in jazz, improvisation was at the heart of the process, a central value, rather than a remedial move. And that's also why jazz has been called “the sound of surprise.” So this is one way of articulating a tremendous shift in worldviews that reflects the centrality of creativity, and specifically an embodied creativity, in the moment.

Russ: Interesting. Out of the U.K. comes the work of Sir Ken Robinson who I've interviewed for Integral Leadership Review. His work is on trying to promote more attention to fostering creativity in elementary and secondary education.

Alfonso: Exactly. I think that's vital work. He's promoting a more complex and nuanced understanding of education and creativity. When I tell people I'm interested in creativity, I always want to hear what they think about creativity. How do they understand it? What does it mean to them? I'm interested in the implicit understandings of creativity. I think right now, we're going through sort of a transitional phase where there's a certain kind of creativity—an understanding of creativity that emerged in modernity—that is beginning to fade. It has to do with the lone genius—the “who” of creativity. It has to do with creativity being limited to the domains of the arts and sciences—the “where” of creativity. It has to do with the creative process portrayed as limited to the moment of insight, the moment the light bulb goes off—the “how” of creativity. There's a shift happening in our understanding of creativity that's quite significant, and I can even see it generationally. When you ask baby boomers about creativity and millennials about creativity, you get different responses.

Russ: I would assume that what we are doing is going from the place of the individual creative act—the individual as a creator or having creative capabilities, and the

collective as a source of a creative phenomenon while recognizing that creativity very often is emerging from the dynamics of relationships, interactions and life conditions and a variety of variables—into a position of a both/and. There are the dynamics of creativity at the individual level as well as the collective dynamics of creativity. Is that the kind of thing you're getting at?

Alfonso: Exactly! There's an emerging networked relational understanding of creativity, with more emphasis on everyday/everywhere creativity, and with popular books such as Gladwell's *Outliers*, an increasing awareness that yes, creativity also requires hard work, practice, etc., which counteracts the romantic myth of genius without learning.

When I started looking at the creativity research in the 80's, my experience of creativity had very much been playing in a band. But there was no research on creative groups in the literature, and there is not nearly as much as on the creative individual. I thought that was really interesting, because that also reflects what we think creativity is, where it can happen, and how our ways of thinking influence how we approach a phenomenon—think reductionism and individualism, in this case.

Until very recently, when people talked about creativity, they talked about it in terms of the creative person, process and product, PPP. In this frame, the “who” of creativity always has to be an individual. It can't be a group or a relational process. So inevitably, the “who” or the unit of analysis—the actor—is always an individual.

That's beginning to change. We're also starting to look at the individual as not being a closed system that's isolated from the world. We're looking at the fact that creators work in *domains* that have a history. Coltrane and Charlie Parker were both great innovators, but they were part of jazz. They were part of an existing discourse that they had already internalized. This inquiry also starts challenging what our understanding of the individual is. The discourse refers to individual and social dimensions, but we can't forget that the individual is also social. We are in society and society is in us.

Russ: It would seem to me too that one of the things that would be useful in terms of thinking about creativity would be that of perspective. From a first-person perspective, something that may be creative for the individual in terms of his or her own life experience might be different from that which would emerge from a second-person relationship. That might be different from the point of view of an “objective observer.”

Alfonso: It's the classic case of someone who comes up with a very interesting and creative solution to a problem, but that doesn't mean it hasn't been done before. Now the fact that that person comes up with an interesting, original solution is a sign of creativity. It feels creative and it is creative from that person's first-person experience and in that context. You frequently have this with children. Children are constantly creatively reinventing the equivalent of the wheel. From their perspective, it's a creative process and a creative product.

A different example: My wife and I like to travel, for business and pleasure. Occasionally she'll go into a hotel and say, "Well, it's clear that whoever designed this hotel has never actually stayed in a room they designed." And I think that's a brilliant insight. Academically, there's great research on this in Flores' and Winograd's book, *Understanding Computers and Cognition*, and the whole issue of first person perspectives. Very often, though, that's completely left out, and there's stuff that looks great on paper. Even when you see a drawing of it and you think it's fantastic and chic and elegant...the bottom line is, there's no place to put stuff in the bathroom, you know? What do you do with your stuff? This may look great, but there's no functionality.

Russ: Before we leave the stage of your dissertation, your Dissertation Committee Chair was Béla Bánáthy. What was his role in your thinking around this theory?

Alfonso: I was really lucky, because Béla Bánáthy was a wonderful teacher. Béla had deep roots in the systems world and had been President of the ISSS—the International Society for the Systems Sciences—so I was really happy and privileged to work with someone who had that kind of in-depth experience of the field and the community. Béla was very idealistic and very optimistic about the ability of systems approaches to be able to make a difference in the design of educational systems. He really stressed the "thinking" in systems thinking, and emphasized the radical nature of the shift implied by taking systems theory and cybernetics seriously. I also read and then met Heinz Von Foerster, Paul Watzlawick, the Italian epistemologists Mauro Ceruti and Gianluca Bocchi, and finally Edgar Morin, who developed the notion of complex thought.

Russ: So this whole piece about how we think—as you say—it has been an important piece. Can you say a bit about what that is?

Alfonso: Growing up in different cultures and always enjoying being exposed to different perspectives—when I was in London, I was a university student, I was playing in a band and working as an interpreter for the police in Scotland Yard. My parents were diplomats, so I moved around in a number of circles ... And today, I have multiple lives: in academia, in the consulting world, and in music—I perform with and produce my wife, Kitty Margolis's work: she's a very well respected jazz singer (<http://www.kittymargolis.com/>), and working on her CDs, with such incredible musicians as Joe Henderson, Roy Hargrove, and others, has been an invaluable experience for me, not to mention a lot of fun.

From an early age, I realized that individuals and cultures construct worlds differently. That sort of became a continuing theme for me. Then in grad school, I read Thomas Kuhn's work and immersed myself in the philosophy of social science. I became very interested in the underlying assumptions of Western academic inquiry and Western thought in general. That's when I became interested in epistemology, in how we think about particular issues, the different frames we create, and how they both obscure and reveal. My personal frame was that it was all a creative process. I also realized that thinking has a certain logic, a certain architecture, if you will.

To give you an example, I think many misunderstandings arise about creativity because it is a paradoxical phenomenon. Creative individuals are said to be both more playful and more grounded in “reality,” both rebellious and conservative, both “crazier” and “saner,” and so on. But this requires a different way of thinking, a way of thinking that goes beyond our common logic of either/or. Because otherwise it’s just, “see, creative people are crazy,” and we focus on one dimension without taking into account the other. But if they’re both crazier *and* saner, what does that mean? What are the implications for our definition of psychological health? What does that look like? There’s also a shift to an ongoing process rather than a “thing,” a broader spectrum of psychological and experiential possibilities, a different view of identity, and so on.

Russ: When I think about systems theory, one of the critiques of pure systems theory is that it does not attend to those kinds of variables (what cannot be measured directly). Even in the case of transdisciplinarity, that whole piece about what we cannot directly observe has not played a central role—at least in Nicolescu’s work, other than the notion of the included middle. But it does have a potential in the sense that in transdisciplinarity we’re talking about levels of reality and complexity and the logic of the included middle.

Actually, in an earlier issue of Integral Review, I have an interview with Nicolescu about this. We’ll have an article by a philosopher from Holy Cross, Predrag Cicovaci appearing in the October 2009 Integral Leadership Review entitled, “Transdisciplinarity as an Interactive Method: A Critical Reflection on the Three Pillars of Transdisciplinarity.” The criticism that he brings is that there has not been adequate attention to a fourth pillar that he would add which is values.

In light of that kind of work, how has transdisciplinarity become a significant approach/perspective/methodology in your work?

Alfonso: I have interpreted transdisciplinarity drawing on my own experience. So for me, I have four dimensions of transdisciplinarity. For me, it’s inquiry-based rather than discipline-based. As an example, if I get called in by an organization that wants to be more creative, if I approach the job exclusively with the disciplinary perspective of the psychology of creativity, then what I’ll do is to focus on individuals and give them a “creativity tool kit” so they can explore lateral thinking and other things in order to be more creative *individually*. Here you have an example of how a disciplinary lens directs you to certain kinds of approaches. An approach that’s inquiry-based starts with the phenomenon in question, in this case looking at the organization and there many, many different things going on. That includes individuals, relationships, organizational culture, organizational structure, openness to risk-taking, the business climate, and all these issues that are typically addressed in different disciplines. For me, the important thing isn’t the discipline, but the issue that I’m addressing. Then you bring in *pertinent knowledge* from whatever disciplines are relevant.

The second dimension of transdisciplinarity is something I call the “meta-paradigmatic.” In other words, the question then arises that you’re going to be drawing from all these different disciplines. Do you have to know everything about everything?

It's a typical question that's asked of people who want to do interdisciplinary work. The answer, I think, is no. If you're going to be drawing on other disciplines, you have to have an understanding of the historical emergence of that discipline, and you also have to have an understanding of the underlying paradigmatic assumptions. For instance, in the case of creativity, a sociologist and anthropologist have historically looked at creativity as a social phenomenon. They tend to be methodological holists, so for them, the individual is not important. For them, the individual is epiphenomenal in the same way that for psychologists, who are, by and large, methodological individualists, society is epiphenomenal.

If you look at most of the studies of famous creative persons, there's not too much interest in the historical context. The focus is usually personality and cognitive processes. For sociologists, it's the other way around. It's like, "Hey, look, if it hadn't been Darwin it would have been Alfred Russell Wallace. If it hadn't been Freud, it would have been someone else." In their view, society had collectively reached a point where certain questions and certain issues were ready to pop. Someone would have figured this stuff out sooner or later. So these are very, very different fundamental assumptions, very different units of analysis. Here we get into the philosophy of social science. It's how you create your understanding of creativity.

To make a long story short, no, you don't have to know everything about everything, but you have to know how different kinds of knowledge are constructed. How is knowledge created and constructed?

The third dimension of transdisciplinarity is that you have to have a thinking that allows for complexity, so it connects that contextualized information. It can't be reductive and disjunctive. It's not either/or. It has to connect and contextualize, because otherwise none of this makes sense. There's a common criticism that's legitimate of many forms of systems theory, namely that it is a form of mapping. The kind of systems-influenced work I'm interested in is quite different, and is fundamentally epistemological in nature.

When you look at the organization of both universities and the organization of thinking, there are interesting architectural parallels. When you look at the university, you have these different departments usually housed in different buildings. Disciplines have all these different branches. Knowledge is reduced to finer and finer levels of granularity. That's a reflection of the way we were traditionally taught to think—by reducing and isolating and getting down to the smallest variable—the logic of either/or until you reach the bottom. The university is the concretization and institutionalization of a certain way of thinking. So for transdisciplinary work, you have to learn how to contextualize and connect. That's originally what systems theory was attempting to do. The original mission of Von Bertalanffy was to create that kind of transdisciplinary language.

Russ: It seems to me that one of the drivers of Nicolescu's work is also the connection between theory and research; seeking to understand and practice. It sounds like that's something you share with him.

Alfonso: Absolutely. Transdisciplinarity is not at all some abstract, purely theoretical endeavor for me. It emerges out of a real need to address the complexity of life. And for me, the fourth dimension is that you have to integrate the observer into the observed, the researcher into the research—the person actually dealing with this complexity and trying to make sense of it. You have to address the researcher and his/her perspective and values and where s/he is coming from. You can't just bracket that or ignore that. For me, that's an essential part of transdisciplinarity.

In both of the programs that I designed at CIIS, we start out by asking people about their passions. When they tell us, that in itself becomes an opportunity for inquiry. You ask, why they are passionate about one topic but not another. This gives an opportunity for self-reflection, self-inquiry and finding out why one cares about something specific—and in fairness, why you would want to spend 4-6 years and a lot of money working on it. As a result, a number of different issues emerge from their own life stories. So passion in this sense is good. We want passion—intrinsic motivation is central to creativity. At the same time we don't want people to be blinded by their passion, so once again you have an opportunity for self-inquiry.

Russ: From the point of view of the inquiry and the relationship to the transdisciplinarity perspective, doesn't this also speak to the value of recognizing the collective dynamics of that inquiry? For instance, when you go into a system as a consultant, you're engaging those people in that system in the inquiry. So the exploration or the design of the approach to generating creativity within the organization is going to be something that emerges out of that collective inquiry.

Alfonso: Absolutely—I couldn't agree more! When I talk to people about creativity in organizations, especially in a consulting context, they often expect me to come in with a specific process already in place, because that's what they're used to. I tell them each time that there is no cookie-cutter approach I embrace. I think it has to start with a collaborative research process in which we figure out what the best way is to facilitate the development of creativity in any particular context. That's definitely part of the process.

Russ: So transdisciplinarity and your interest in the metaparadigmatic also lead us into meta-theory. A couple of examples that have gained attention in recent years include Wilber's work in integral theory, and Ervin László's work in his theory of everything in the Akashic Field. How would you characterize, from your point of view, the transdisciplinarity overlay, the perspectives being offered by those two leading thinkers?

Alfonso: They each open a range of possibilities in different ways. Wilber does something I have always found very important, and that's expanding our understanding of human nature and of human possibilities. Underlying political, psychological, sociological, and essentially all theories in the social sciences is an understanding of human nature. These

were still addressed explicitly by philosophers—from Plato to Hegel. But as the various disciplines spun off philosophy, the fundamental philosophical assumptions—such as the nature of human nature—were generally not addressed anymore. Specialization led to these key questions remaining un-addressed, which is why political theory has mostly barely addressed Freud, let alone Maslow. Another thing Wilber does very well is showing how much is typically left out of any particular inquiries and the extent to which they come out of a particular frame.

Russ: He points at our blind spots.

Alfonso: Exactly. What's also so interesting about Wilber and László is they are really pushing out into areas beyond what is considered safe within traditional academic boundaries and context. They are independent researchers who don't necessarily have to play within those kinds of safety margins in order to be assured of tenure or respectability or whatever. They can do that. In the programs I designed at CIIS we want to capture that excitement and creativity, and create a new context for academic research.

Russ: You've had a relationship over the years with Ervin László, and as I recall, you edited an edition of World Futures.

Alfonso: I'm the associate editor of *World Futures*. I've known Ervin for about 20 years, he's a truly remarkable individual. *World Futures* is the journal of the General Evolution Research Group, an interesting group of researchers that included Bela, Riane Eisler and David Loye, Karl Pribram, Allan Combs, Ilya Prigogine and Ralph Abraham among others. I think Ervin was interested in having these multidisciplinary dialogues and finding ways in which researchers in different disciplines could draw on these evolutionary and systems concepts. A lot of important work has been done, and these ideas are now becoming more widespread.

Russ: In the field of leadership studies, there was an attempt under the auspices of James MacGregor Burns to use a multidisciplinary process to create a general theory of leadership. They published a book titled The Quest for a General Theory of Leadership under the editorship of Goethals and Sorenson. What is most striking about the results of their work that took place over several years was the fact that they did not, in fact, achieve a general theory of leadership. One of the things that I argued with Sorenson about was that one of the key reasons they did not succeed, at least from my perspective, was because they started from the point of view of multi-disciplines, and not with a meta-theoretical perspective. I'm wondering if you have any reflections on the importance of meta-theory and the practice efforts that we are concerned with.

Alfonso: It's all too common to get people from different disciplines together and have dialogues that really don't go anywhere. Ultimately, there is little understanding of each other's fundamental, underlying assumptions. So the participants are really coming at issues from different theoretical perspectives, and are literally not speaking the same language.

I think a meta-theoretical perspective is really important. That's one of the reasons why I think a kind of thinking that is more open to connection, contextualizing, and draws upon systems and related theories, but isn't confined to them, is very important. It addresses some of the key fundamental issues and provides a language that can go across disciplines. Without that—without understanding each other's assumptions; without a shared meta-language—it's really difficult. Otherwise, you're just comparing positions rather than understanding them and communicating about them.

Russ: What is the contribution of László's "theory of everything" to our efforts at finding a framework or perspective that helps us embrace the whole?

Alfonso: One of the things that he did, particularly in the early days when he was still widely identified as a systems philosopher was to articulate some of these basic concepts in books like *Evolution* and the early systems books. I think many of those concepts can be used effectively to provide that kind of language and some basic concepts that cross any number of different disciplines. Just the concept of system, and the distinction between open and closed systems is very valuable, and in need of much more study. But not just in the context of ideas and how we use them. I think essentialism in all its forms is explicitly marked by a form of closed system thinking, for instance. Once you start looking at it that way, a number of interesting implications emerge. Over the last 10-15 years or so, I've found that Edgar Morin's work has been very useful to me. His work is not so much in the tradition of the Santa Fe Institute, but more on the epistemology of complexity. That's what really makes a difference. What is particularly interesting about Morin is that his work, which has already made a profound impact in the social sciences is now being recognized by biologists as leading the way beyond the reductive perspective of molecular biology. That's quite a feat, when you consider the contempt much of (post-)modern philosophy and social science is held in by "hard" scientists.

More broadly, what we need is a kind of education that prepares us for complexity, interdependence and uncertainty. But traditionally we have been taught that simplicity, isolation of variables and certainty are the *summum bonum* of inquiry. Our thinking has reflected that bias. In order for transdisciplinarity to thrive, we have to cultivate a new way of thinking, and, to be clear, a thinking that is not isolated from feelings, intuitions, and experience.

Russ: Despite the resistance of academia to some of these things, there are glimmers of hope around the world in Brazil and South Africa and Europe where educational institutions are trying to take on transdisciplinary perspectives in their approach. I've just recently learned that Arizona State University has taken that on in a number of programs. I'm trying to find out more about that, and I'm going to Tempe for about six weeks later this month. Any hints as to someone I can talk with?

Alfonso: No, I am actually more familiar with what has been happening outside the US. I've just recently found out about ASU. I've been meaning to look into it. I was down at the University of Vera Cruz in Mexico not long ago. They have a really innovative master's degree in transdisciplinarity and sustainability. They are very influenced by Morin's

work. The head of that program, Enrique Vargas, was about to head out to ASU to study their work.

As you said, in Brazil, there is a great deal is going on in this area, and I was just in Peru where I was invited to be on the board of the Edgar Morin Center for the Study of Epistemology of Complexity at Ricardo Palma University in Lima. In Italy, at the University of Bergamo, there is a transdisciplinary doctorate, and there is some truly remarkable work going on out there. I'm thinking particularly of the work of Mauro Ceruti, Gianluca Bocchi, Sergio Manghi. At the University of Messina in Sicily, they are doing inspiring work on the philosophy of science and in education. In South Africa, John Van Breda and his colleagues are also doing some wonderful things looking at sustainability from a transdisciplinary perspective. So there is definitely a movement in the right direction.

Bruce Wilshire wrote a fascinating book about the perils of disciplinarity 20 years ago, *The Moral Collapse of the University*. He discussed disciplinary boundaries, and used Mary Douglas' work on purity and pollution to illustrate the way that new faculty members were purified of any polluting influences of other disciplines, precisely because there are a lot of issues having to do with territory, identity, where you belong, where funds come from, and also with the fact that if people are starting to play around with all these different concepts from different disciplines in one particular paper, then my education has to change. I can't just be a psychologist. I have to start spreading out, and the implications are huge. It's not just the students who are facing these challenges—it's the faculty, perhaps above all! So we still have a struggle ahead of us.

Russ: I'd say this is just the beginning.

Alfonso: There are signs that we will, by necessity, be heading in this direction. I think one of the important things to illustrate is this is not some abstract, theoretical effort. This is really an attempt to deal with the world and to do so with extremely practical implications. It's perhaps not surprising that transdisciplinarity is now associated so often with ecology and sustainability: one discipline just can't do the trick.

Russ: Can you speak a bit to creative inquiry? We touched on that earlier.

Alfonso: Creative inquiry is essential to both the doctoral and the master's programs that I designed at CIIS. If you look at the definition of a Ph.D. dissertation, it's defined as an *original* contribution to your field. But the bottom line is, no one ever talks to you about what "original" is, unless they're talking about plagiarism. I thought, "Well, what if we took this definition of a dissertation seriously?" Then, by definition, if it has to be an original contribution, then the dissertation has to be a creative product, and, the educational experience has to be a creative process. How about that as a starting point?

What I'm interested in is an educational process that is a creative process, whereby the process of inquiry itself is creative—where we are also engaged in a process of self-creation as scholars, as participants in this remarkable time, and ultimately as human

beings. Any kind of university or educational experience has a tendency to change people, even a little bit. But what if we made that explicit? If a person is going to spend five years or so working on a dissertation, let's look at that as an opportunity for you to engage in self-inquiry and self-creation, as well as the creation of an "original contribution to the field."

When someone emerges from a program with a Ph.D., what does that really mean? What are you going to have your doctorate in? Why are you doing your research on this subject? Where do you situate yourself in your field? What contributions do you want to make? Who are you becoming? How are you spending your time? In that sense, we're making some of the things that are implicit in the process very explicit. We're framing the whole thing as a creative process, and I think the results have been very interesting. On the one hand, it's natural, and students think it makes a lot of sense. On the other hand, it scares the bejesus out of them. It's arguably a lot harder and more challenging, but well worth it.

Recently, education has fallen into more of what I would call a reproductive approach, which involves reproducing what the faculty tells you to in order to get the grade. It's also reproducing a certain form of social organization and a way of being in the world. While students really like the idea of creative inquiry, typically they tend to have a little bit of an existential crisis, when they actually have to engage in it. It's the anxiety that comes with freedom. Because at the same time they're thinking, "This is exciting!," they're also thinking, "I may be free, and you may be telling me that it's good to be creative, but what's going to happen to my grade, and how do I know what I really like? Am I really creative? What do I really care about?" It raises a lot of deep questions. So inquiry and self-inquiry are inextricably connected.

Russ: This reminds me of William Perry's work and his research on students in particular. He has a model that, with all its nuances, has a dozen or so different levels. His research showed—and this has been replicated in research particularly with engineering students in Colorado and Pennsylvania and probably elsewhere—that in a 4-year college education, students initially see the faculty member as the authority figure with the knowledge. During their education, they shift through several levels, and by the time they graduate, their locus of authority is more internal rather than external. Yet, I'm hearing you suggest that at the graduate level now, we still have the phenomenon—maybe socially inspired or inspired by the nature of the educational system—that even though I may have reached a point where I privately might rely on my own internal locus of authority, publically I need to continue to pay attention to the external one.

Alfonso: Right. And this is the case all over the country. There's lots of new research about the way the Millennial generation has been educated, the implications, and the challenges they're facing after being hounded about grades. I like the reference to Perry's work, because I differentiate between what I call reproductive, narcissistic, and creative inquiry. If you break Perry down into those three main perspectives, it goes like this: In the beginning, or reproductive stage, the authority is all with the instructor. The next stage is where the students think it's all relative: with the collapse of authority, "the one right

answer,” they think anything goes. This is a practice that translates into the students feeling it’s all about them, all about their feelings, all about where they are, their “subjectivity,” all the stuff education formerly rejected—the return of the repressed, right?

(laughter)

But at the same time, at that stage they may not understand what counts as significant anymore, so they don’t appreciate the value of tradition, craft, hard work, and so on. They don’t appreciate that some statements may be more valuable than others and that leads to the more narcissistic stuff. Creative inquiry is about cultivating a much greater sense of context, more of a sense of collective self-creation. I think that’s when things get really interesting. It definitely maps onto the Perry work.

The way I see it, it’s about an ongoing process of creative inquiry, where the process is the product. I think this is similar to a jazz performance of a “standard” from the Great American Songbook, which offers an opportunity to perform together, to inquire together, to allow for the emergence of novelty from the interactions of the participants. The point is not to find THE answer, but to find ever greater opportunities to continue the inquiry, illuminating new dimensions of what may be a well known song, finding new forms of expression, new ways of being together and developing new insights into the material we’re given. Are you Coltrane or Desmond, Miles or Satchmo, Elvin or Max, Jaco Pastorius or Paul Chambers, Herbie Hancock or Art Tatum, Ella or Sarah or Carmen or Betty or Kitty? Are you finding your own voice, and articulating new insights into the songs that can be meaningful and generative for you, for your context, for other people? That’s our challenge.

Russ: And this is what you’re trying to foster at CIIS?

Alfonso: It is—in the leadership program, in the doctoral program, and in my consulting work with corporations and artists.

Russ: Alfonso, I thank you very much for our time together, and I hope this has been as interesting for you as it has been for me to hear the broad spectrum of work that you’ve done and the interests that you have.

Alfonso: Thank you for giving me the opportunity to dialog with you; I’ve enjoyed it a lot.

The Return of the Perennial Philosophy. The Supreme Vision of Western Esotericism

By John Holman.

Watkins Publishing, 1st edition London 2008. Paperback, 172 pp.

Review by Roland Benedikter

This book tries to provide a short integrative picture of the Western esoteric worldview, seen as the historical basis of contemporary “experiential” spirituality. Holman’s main hypothesis is that in the present epoch of a broad renaissance of traditional religion it is increasingly becoming necessary to know the main themes and features of the “empirical spirituality” of the West that have long been hidden in the background of its public sphere. “Empirical spirituality” is conceived as being opposed to mere “faith” and dedicated instead to “spiritual research” and “exploration” in “first person.” To identify what the common ground (or the “supreme vision”) of the very different Western esoteric streams has been in the last seven centuries shall enable the reader to help prepare the present culture of secular rationality for the “return of the perennial philosophy,” and thus for a more balanced societal paradigm. “Perennial philosophy” is outlined as an experimental proceeding of opening up new empirical knowledge between realism and transcendentalism. According to Holman, this proceeding has always been equipped with certain methodological tools common to more or less all Western esoteric traditions in order to create experiential alternatives to collectivistic, myth-oriented religion.

The book consists of an introduction and three main parts divided in 13 chapters. The *Introduction* gives a brief overview of the studies carried out so far about the field mainly by means of a critical history of ideas, and depicts the “ethnomethodological” approach chosen by the author. This approach consists in studying the esoteric traditions “from within,” i.e. in a consciously participatory and identificatory way, or as the author puts it, “as practitioner.” Building on these methodological presuppositions, *part one* starts with an overview of the main currents of Western Gnosticism, among others Neoplatonism, Hermeticism, Alchemy, and Kabbalism. Most importantly, it tries to differentiate between traditionalism and progressivism within the historical esoteric efforts in Western culture. The focus of Holman’s historical overview is hereby on Theosophy, which he interprets as being a kind of “historical knot” within the development of an “empirical spirituality” (chapters 1-4). The *second part* of the book tries to identify the “philosophical and spiritual center” of Western esotericism as an initiation process common, in diverse forms, to all its sub-streams and variants. This (according to Holman mainly fivefold) initiation process is exemplified in five rather descriptive chapters (chapters 5-9). Finally, the *third part* discusses the rise of a “spiritual psychology” in the 20th and 21st centuries, mainly through the approaches of Carl Jung, Roberto Assagioli and Ken Wilber. The author purports that this “spiritual psychology” seems to be nothing else than a derivate (as well as the necessary next historical step) of the history of Western esotericism. Holman tries to depict this “new discipline” as the main contemporary form of Western spirituality, as well as a decisive



“psycho-philosophical” contribution to the “change of worldviews” urgently needed by a world in crisis (chapters 10-13). In the future such a “spiritual psychology” has to be included in the general societal self-concept of a modernity that goes beyond the fallacies of “postmodernity” and “progressivism,” but also beyond those of “premodernity” and “traditionalism.”

Holman’s book has its indisputable merits. The structure of his book is clear and precise, and the author proceeds with great security from one step to the next. No previous knowledge is needed for the reader to follow his arguments. The discourse Holman chooses is inspiring to get a first impression of the field, especially for beginners, who are endeavouring in their first contact with the topic. The book invites the reader to discover a whole new “intellectual continent,” and to start more in-depth studies afterwards.

At the same time, like most similar approaches, and like it is maybe unavoidably inbuilt in an endeavour like the one dared by the author, the book presents several problems. These problems can be classified as implicit and explicit ones. Let me shortly come to the *implicit* ones first.

1. The book seems to be ridden by an “unconscious inner dispute” about its center, and this dispute is constituted as a kind of paradox. On the one hand, the book is visibly concentrated on recent (post-New Age) Anglo-American concepts and developments in the (self-)interpretation of esotericism. Only very seldom does it include the Continental European traditions. For example, Freemasonry, as the most important current which helped to give birth to the French Revolution as well as to the American constitution, is hardly mentioned at all, and certainly not appropriately included. Similarly, Anthroposophy is in essence subsumed under Theosophy, which means to oversimplify things. On the other hand, the book constantly mixes Western and Eastern approaches, without discerning them appropriately, and then simply classifies them as “Western.” Even if the book is explicitly entitled “The supreme vision of Western esotericism,” it claims, for instance, that Ken Wilber’s theory of the subtle states of awareness is a current central cornerstone of it. But most of the observers would rather state that in reality most of Wilber’s findings, methodologies and especially of his guiding terminologies have been drawn – even if rather eclectically – almost exclusively from the Eastern traditions. Most of Wilber’s writings are of clear Eastern inspiration and terminology, and do not present sustainable traces of the main currents of Western spirituality, especially not of Freemasonry, Rosicrucianism, Theosophy or Anthroposophy, of which Wilber seems to have only little knowledge (which may be one reason why he has so far not found a durable access to the mainstream of academic research and teaching in European-Western culture). Cf. his exemplary negative judgement on Rudolf Steiner just in a brief footnote (sic!) in “Sex, Ecology, Spirituality” (1995).

2. A second problem is that the author is not “scientific” in his approach, but “identificative.” The approach chosen by Holman is in principle logically understandable and maybe even methodologically needed; but it is carried out in an at least partially questionable way. The cadence of the work is one of a private expert speaking as part of a community, not as an academically embedded scholar dedicated to a sound “subjective-objective” exploration. Holman seems not to ponder things from the standpoint of the necessary “epochè,” but often falls into a style dangerously close to propaganda. That is mirrored by his sometimes vague, and in general rather literary than scientific use of terms (for example, “the virus of postmodernity,” “quantum leap ... of esotericism” etc.). Holman is repeatedly even polemic against academic scholarship,

and this will most probably not be helpful for the establishment of spirituality as an academically accepted (and funded) topic.

3. Related to that, the author rarely addresses his main guiding concepts – such as “evolution of consciousness” – critically (and thus, as the standards of current academic scrutiny would demand, dialectically). By not doing this and rather departing from an “identity position” of concepts, Holman tends to give his own interpretation of concepts as *the meaning* of them. This may be inspiring for the beginner, but it is not accurate. This fallacy is especially noticeable in part two of the book which tries to address the alleged “four main Enlightenment” of the “*philosophia perennis*,” which are depicted as being common to all sub-currents of Western Esotericism. But this basic assumption could be seriously challenged by a deeper look into the history of ideas and esoteric practices. Most probably, some of Holman’s descriptions in this regard would not be unquestionably endorsed by any other movement within Western Esotericism except by his own.

4. These implicit problems now culminate in one aspect that I personally regard as crucial to be addressed in further similar attempts. It is the fact that there is no such thing as an “identity in itself” of no philosophical or esoteric approach in history, be it as “perennial” as imaginable. From the standpoint of the contemporary history of ideas, more emphasis must be put on the fact that within every current of thought, be it considered at the typological macro-level or at its factual reality-level, there is, has been and will most probably always be – with no exception – a constitutive dialectics between at least two sub-streams in its inside, which battle each other for the overall direction of the thought and its methodology. That is valid also for “integral” thought and practice. There is no “integral theory” as such, but there are many claims for it, which must be understood out of their contextual relationship with various constituents. This seems to be a decisive aspect to me, especially if seen from a contemporary perspective like the one voluntarily chosen by Holman. It is crucial for the sheer quality of the debate both in a public and “internal” perspective. I think there is a self-identification of Holman’s perspective as *the* perennial philosophy inbuilt in his basic aspiration, as well as implicit in the basic attitudes of most of his main doyens, including John Huston, which hinders their “philosophies” to become an accepted subject of discussion. And it is this attitude that most likely creates part of the existing problems for the development of a truly contemporary “*philosophia perennis*,” because it is due to this attitude that many of the streams and currents that identify themselves as being “integrative” or “perennial” battle each other, instead of seeking exchange, and integration among them.

5. That is, from my viewpoint, one reason why in its present form the book of Holman can hardly give a sustainable impulse to the discussion neither about nor within the field, not even at the present moment when the “global renaissance of religion” would indeed provide a valuable (counter-)framework for a “return of the *philosophia perennis*.” Holman’s book does not differentiate in its attempt to unify. To insinuate, for example, that Wilber and Tarnas are saying mainly the same things, will hardly be confirmed by neither of these authors. If the inner differences and conflicts within the currents that would call themselves today being part of the “*philosophia perennis*” are not addressed, no “unifying picture” will be accepted by a satisfying number of potential participants.

Among the *explicit* problems, I would like to mention only two:

1. The book presents no satisfying differentiation between experiential, religious and “rationally enlightened” sub-currents in the field.

2. The organization of the book is slightly unbalanced. Out of 164 pages of text, 32 are dedicated to footnotes, which means roughly a fifth of the book. The Index seems to be similarly over-detailed if compared to the grade of detail and to the overall length of the main text. It causes an impression of over-condensation of the text, and thus of over-simplification.

Holman’s book seems to be written in a rather “New Age” mood and style. If compared to other similar, but much more elaborated and “deep” titles, such as Wouter J. Haanegraaff’s *New Age Religion and Western Culture. Esotericism in the Mirror of Secular Thought* (State University of New York, SUNY Series on Western Esoteric Traditions, 1998), which Holman himself quotes in the methodological part of his introduction, or to Helmut Reinalter’s *Die Freimaurer* (Beck Verlag, Munich 2001), Holman’s book does not seem to be sufficiently competitive. This is because it is not balanced, “distanced” and scientific enough. Holman’s book tends to oversimplify things, and it seems not to be able to satisfactorily represent the variety and complexity of the field addressed. Instead, it often falls into identifications with particular interpretations. That would in principle not be a problem, because it is probably inherent in the very difficult (if not impossible) attempt to give a short and introductive “unifying picture” of Western “Empirical” Spirituality as such. But it becomes a problem when Holman tries to sell his particular interpretations as *the philosophia perennis*.

To sum up, Holman’s book is an interesting, but incomplete contribution. It is unable to sketch a sustainable outline of how to mutually include Rationality and Spirituality for the years to come. On the one hand, Holman’s discussion about the future relationship between “Postmodernity” and “Spirituality” (chapter 10) presents some potentially fruitful elements. On the other hand, Holman’s book is no substitute for more scientifically sound and in-depth investigations that still have to be written. It cannot be considered as representative for the field, and it is not of an appropriate erudition to claim to be a satisfactory introduction to it as a whole neither. It is, at its best, a good representation of a partial (self-)interpretative approach *within* the very differentiated and diversified streams of the *philosophia perennis*.

Roland Benedikter, F. Prof. Dott. Dr. Dr. Dr., is European Foundation Fellow 2009-13, in residence at the Orfalea Center for Global and International Studies of the University of California at Santa Barbara as the Foundations Research Professor of Sociology, and Visiting Scholar 2009-10, The Forum on Contemporary Europe, Stanford University.
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Correspondence

Public Letter in Response to Z. Stein and K. Heikkinen's

June 2009 *Integral Review* article (V5, N1, p. 3-24)

"Models, Metrics and Measurement in Developmental Psychology"

by William R. Torbert, Professor Emeritus, Boston College

Sent initially to the *Integral Review Newsletter*, Z. Stein, K. Heikkinen, S. Ross, J. Reams, and other scholar/practitioners whom I think of as having a direct interest in the LDP instrument: S. Cook-Greuter, D. Rooke, E. Herdman-Barker, R. Livne-Tarandach, A. Nicolaidis, D. McCallum SJ, H. Bradbury, B. Morrill, J. Sabbage, S. Taylor, K. Merron, J. Hartwell, K. Yeyinman, G. Young, N. Wallis, C. Palus, J. McGuire, E. Kelly, J. Rudolph, P. Foster, M. Krot, PCT ...

I welcome the intent of Zachary Stein's and Katie Heikkinen's June 09 *Integral Review* article: To generate further sharing of quality control information in regard to the development of usable knowledge in the field of developmental psychology.

Having myself vowed to write nothing more 'academic' starting in 2009, I limit myself to this informal letter referring briefly to a few historical and more recent types of reliability and validity testing conducted on the Leadership Development Profile (LDP), with references, in an attempt to invite further written work on these matters, but never again by me.

I also want to take this opportunity to invite Zak and Katie, as well as any of you with a continuing scholarly and practical interest in the LDP who hear about this invitation in time, to join me at my home for a day of study of the extant LDP-reliability-and-validity literature and of the continuing challenges, as I pass on whatever I can of this work to others of you...

(the time and place, more specifically, is 138 Parker St, Newton MA, 11am-5pm, Saturday October 3, with a good drinking/eating/music/dancing party afterwards

for those who so wish [I'll try to get one of my sons to play his guitar and I'll get Pacey Foster to d-j]. Let me know if you're answering 'Yes.'

On the academic-writing front, it's up to any of you who are so motivated to pursue these matters after this and after the Oct 3 work/party (tho I will be more than happy to provide leads and materials if I can, as well as to speak by phone). Please let me know if that Oct 3 date seems attractive; those of us coming can design it together.

Turning to Stein's and Heikkinen's overall discussion of models, metrics, and measures, it seems to me excellent as far as it goes... **but** in my view stops short of some of the critical validity and practical/ethical issues of the human sciences, as I will suggest below toward the end.

In addition, while you two authors are commendably clear about the limits of your exploratory empirical study of the validity of certain specific developmental measures, it turns out that, at least from the point of view of my now-completed scholarly career, your methodological limits have resulted in a profoundly inaccurate portrayal of the validity-testing-history-and-published-literature in regard to the Leadership Development Profile (LDP)...

(While at the same time confirming your very own new measure you've recently begun developing as best of all...).

(The alternative hypothesis should certainly also be conceivable to a professional social scientist: at its most personally provocative, as I guess you'd expect a 180-degree-opposite alternative hypothesis to be, the alternative hypothesis = that *my scholarly career would best be left in deep shadow* for at least a while longer, maybe always, in the scholarly/academic world of leadership, organizational transformation, integral-quant-qual-&-action-methodologies, etc.).

At the same time, there is no doubt that the validity testing background of the LDP has long grown slowly in deep shadow, not widely recognized in the psychometric, psychological, sociological, political science, or leadership-studies literatures (an exception is McCauley et. al., 2006)... So this is a great last opportunity for me to bring additional attention to this body of work.

Based on your way of reviewing data, you – Z & K – found no Leadership Development Profile (LDP) validity studies. In a footnote, you state that although some LDP-based studies [e.g. Rooke & Torbert, 1998] cite Loevinger's studies as confirmation of the LDP's reliability and validity, "Loevinger's studies are out of date [new raters, scoring criteria, and levels are now used; metrics need to be re-calibrated], so they are not included here."

Thus, in a reversal of the story of 'The Emperor With No Clothes,' the review apparently discredits the Leadership Development Profile (LDP) measure as 'all public costume' and 'no scientific body underneath' (and many readers are likely to take that as gospel & inquire no more).

As I reflect on this matter, I find it both *surprising* and *unsurprising* that you found no validity studies of the LDP... Given the way you searched...

It seems *surprising* in that at least one of you – the tall one – attended a conference session last summer at which I and several colleagues presented a prize-winning paper on a wide variety of validity-testing studies on the LDP, which in turn referred to my most recently published book (*Action Inquiry*, Berrett-Koehler, 2004), which contains an 18-page appendix on the history of the LDP, with references to a number of quantitative studies using, and testing particularly the external validity of, the LDP. (It almost seems, Z, as though you reacted to something about that event that made you counter-dependently ant-agon-istic...???)

External (field, catalytic) validity is arguably least demonstrated by other developmental measures heretofore and is arguably the crowning validity consideration, as well as the most relevant to the practical ethics of using the measure responsibly in the worlds of practice (see brief examples below).

In regard to *Action Inquiry*, it is also noteworthy that the first listed associate author of the book is Dr. Susanne Cook-Greuter, a research scholar with whom I collaborated directly for 25 years and whom the authors properly credit with validity testing (Cook-Greuter, 1999) on what is now a somewhat distinct version of the measure (her SCTi / MAP)... but which was, at that time, the same measure. Hence, your article does in fact cite some validity-testing evidence in favor of the LDP without realizing it does so. Moreover, the validity testing work on the LDP has now extended since 1980, so your assumption – Z and K – that the validity tests of the Loevinger form conducted in the 1970s and 80s are irrelevant to the LDP proves false. Our own early validity testing (e.g. Merron, Fisher & Torbert, 1987; Torbert, 1987) was done at that very time based on the Loevinger form validated at that time (see further qualifications below). Thus, your dismissal of the ‘old’ Loevinger-related reliability and validity evidence is unjustified, since we were conducting field/catalytic/external validity data at the time, ‘tho o’ course u wrn’t f’ll’w’ng th’ action @ th time. In fact, despite all the changes among the original and revised WUSCT, the SCTi / MAP and the Harthill LDP, I bet they would show a beyond .80 correlation with one another.

As we can already see, the situation in the field may not be immediately transparent to new entrants... So, there are several reasons why it seems *unsurprising* to me that you two found no validity studies of the LDP, given the way you were consciously looking (i.e., in 3rd-person terms, ‘given their empirical methodology’)... And why this is therefore a useful opportunity to respond to your own repeated and praiseworthy invitation to make this information more widely available for study to other scholars:

First, although Susanne Cook-Greuter and I began working in tandem some thirty years ago to apply and re-craft Loevinger’s sentence completion form (also called WUSCT, of which SC-G is a high-reliability senior scorer) to issues of management and leadership... The measure itself was not renamed the LDP until some 20 years later...

(Our delay was mostly based, I believe, on our collective humility in relation to Loevinger's achievement (even tho' many of us viewed it as slightly less than the contributions of Plato/Hegel/Marx/Kierkegaard/Freud/Jung/Piaget/Erikson/ Kohlberg/Gilligan (my favorite dance-partner-when-twirling-on-Appian-Way)/Wilber/Kegan, et al.)

A second reason why it is *unsurprising* that you missed relevant validity studies of the LDP is that most of our early tests were parts of studies conducted on the external/field/catalytic validity of the measure (based on the relatively well-established internal validity and reliability findings at that time). Thus, they appeared in peer-reviewed journal articles, book chapters, and books about substantive findings from catalytic/field experiments... and not in articles focused primarily on the psychometric properties of the metric itself (e.g. Fisher & Torbert, 1991; Rooke & Torbert, 1998; Torbert, 1987; 1991; 1994; Torbert & Fisher, 1992). Someone(s) may yet author a *JAP* or *JPSP* or other psychometric journal article on all this...

(My current hope/bet is on a collaboration between two doctoral students, among the recipients of this communication, who have yet to meet each other thru any medium so far as I am aware [and who, as young mothers at least, with strong connections to Asia Minor, have much in common]... but many other successful collaborations amongst others of you receiving this note are also easily conceivable...)

A scattershot outline of some of the studies and findings related to the LDP include (and I am phrasing each summary in as different language from the first publication as possible, so that comparing the original report to this one will reveal the most additional information possible):

- 1)An n=281 field study (Torbert, 1994), during which all participants were invited to request feedback on the LDP measure's findings about them, if they so wished. A larger proportion at each later developmental action-logic asked for feedback, a perfect 1.0 correlation on a Spearman Rank Order test, assuming the theoretical prediction that later, post-conventional-&-inter-dependent action-logics are increasingly open to (and increasingly seek out) single-, double-, and triple-loop feedback and learning. Understood this way, the finding supports both construct & external validity).
- 2)An n=96 (in 16 task-teams) field study (Torbert, 1987) shows that those teams (5 of 16) with one or more members measured at Strategist (8) outperformed teams with no one measured Strategist in three ways: in terms of bottom-line effectiveness, and in terms of members' perceptions of efficient time-use and greater within-group support for own learning.
- 3)In an n=177 field experiment over 22-months (Torbert & Fisher, 1992), only 3 of the 177 organizational participants who enacted the many developmental instructional technologies embedded in the organization's regular functioning (which included rotating team leadership roles, 360 assessments, developmental coaching, etc.) during their first 11 months transformed a full developmental action-logic after the full 22 months, according to the LDP. **By contrast, 15 out of 16** of those organizational participants **who** did all the above **and also volunteered for and won** a non-remunerative consulting role with new teams, during their 2nd 11-month participation (including depth-clinical training and processing on a weekly basis), **did transform**

a full developmental action-logic. This finding accounts for an unusually high proportion of the variance (81%, Goodman & Kruskal's tau) of the participants in the field experiment who are measured as having experienced a transformation of action-logic. The results seem a good test of the test-re-test reliability of the instrument, since only about 10% of the sample changed its score. The overall results also seem to document the transformational efficacy of a late-action-logic type of organizing ('liberating disciplines' [Torbert, 1991]) that interweaves voluntary commitment, depth mutual inquiry practices, and the practical demands of real business clients... with the intent of generating adult development.

- 4) In an LDP study of 10 CEOs and their Lead Consultants in 10 organizations attempting to transform (Rooke & Torbert, 1998), only the five CEOs measured at the Strategist (8) action-logic reliably succeeded in generating organizational transformation (accounting for .42 of the variance at a .05 level, Spearman Rank Order test).

In this case, of the four Lead Consultants, three are measured at the Strategist action-logic, one at Alchemist. As theoretically-predicted, in the five cases when the CEO is measured as at an earlier-than-Strategist action-logic, only the consultant measured at the Alchemist action-logic succeeds in supporting the two organizations that nevertheless succeeded in transforming. The 2 non-Strategist CEOs matched with Strategist Lead Consultants made some money but no sustained transformational change in the two organizations they were involved with. And, in the case of the Diplomat CEO [the earliest-recorded action-logic], who was paired with the Alchemist action-logic Lead Consultant, the consultant resigned after the CEO and Board Chair chose **not** to act on the consultant's recommendation that the CEO resign or be fired; 6 months later an ethics crisis that the Lead Consultant had known was brewing led to the firing of the CEO; the organization regressed two action-logics (as understood thru the Developmental Action Inquiry approach, an organization makes semi-permanent regressions easily, whereas an embodied person regresses only temporarily (and for shorter amounts of time the later the action-logic (McCallum, 2008).

Thus, if one adds the LDP scores of each CEO/Lead Consultant duo, then the combined influence of their action-logics accounts for 59% of the variance (at a .01 level, on that same Spearman Rank Order test) in whether the organization succeeds in transforming. The small sample size and the non-parametric statistical test highlight the construct and external validity of the measure as a metric that properly distinguishes among individual cases. I know of no evidence that any other developmental measure has tested or attained this kind of field/catalytic/external validity and would actually examine any such purported evidence carefully (see appendix of Torbert & Associates, 2004), perhaps surprisingly, given my vow not to write about these matters in a systematic academic sense again, but not inconsistently.

- 5) A more recent example of testing the construct validity of the current version of the LDP, entailing an n of 891 LDPs (830 [93.1%] scored as 'Conventional'; 61 [6.9%] as 'Post-Conventional' [Livne-Tarandach & W. Torbert, 2008]) found two qualitatively different factor analysis structures between the two sub-samples, as the theory would predict: the Conventional sub-sample shows eight *distinct* factors, with different stems clustering in different factors; by contrast, the Post-Conventional sub-sample shows 11 *interwoven* factors (we are informally calling it the 'spaghetti-and-meatballs' graph), with more than half (52%) of the stems loading on two factors or more (9 on 2, 7 on 3, and 3 on 4).

These findings, we propose, suggest that – while Conventional group stems in stable themes (e.g. ‘leadership,’ ‘feminine,’ ‘power,’ ‘rules,’ ‘feelings,’ or ‘family’) or larger stable categories (e.g. ‘work’ or ‘emotions’) – Post-Conventionals, by contrast, tend to link different stems together at one time or another, “flocking” differently at different moments. These two, very distinct types of thinking remind us of Plato’s two images of the nature of thought (in his *Thaetetus*): as either ‘marks on the wax tablet’ of the mind, or as ‘birds flying about in the aviary’ of the mind. Put differently, Conventional’s loadings represent a relatively simple mental map, with Aristotelean-ly distinct, independent categories (“nothing can be both A and not-A”); in contrast, Post-Conventionals’ loadings suggest an ongoingly-dynamic, mutual-systems-oriented, inter-independent, ‘living’ mental mapping process, more at home in contemplation of Plato’s dialogues..

Overall, the strength of the external validity testing of the LDP is that a range of different kinds of studies

(lab and field experiments, field surveys, interview studies anchored by LDP scores, and real-time-studies-directly-implicating-the-researchers-and-their-clients-themselves [see e.g. McGuire, Pallus & Torbert, 2007, or Hartwell & Torbert, 1997a & b])

find consistent theoretically predicted and theoretically explainable results and sometimes account for an unusually high percentage of the variance in the process. More recent validity and reliability are available in Torbert et al (2008).

This note has become too long, but I also want to bring to your attention a third reason that I believe helps to account for a mismatch between where and how Stein and Heikennen looked for LDP validity tests and where and how such validity tests have actually appeared in the scholarly literature. This is that, in part by using the developmental ‘paradigm of paradigms,’ I have also, with my closest colleagues and friends, been attempting to embody a late-action-logic paradigm of social science in my work. This Developmental Action Inquiry paradigm (Torbert, 2000a and 2000b) makes, not only the ‘language’ turn, but also the ‘action’ turn (Reason and Torbert, 2001; Chandler & Torbert, 2003) into studying oneself (1st-person research) in action with others at their invitation (2nd-person research) in relation to broader 3rd-person organizations and 3rd-person empirical measures.

As part of making this possible, Cook-Greuter and I (along with David Rooke and Jackie Keeley of Harthill Consulting Ltd.UK and eventually others, such as Elaine Herdman-Barker) radically improved the measure’s face validity (or 2nd-person validity) for working people in general receiving feedback on their performance on the measure (and for legally-oriented human resources departments that didn’t like being challenged by employees about the peculiarly-gendered stems in the Loevinger instrument). We did so by substituting four independently-validated work-related stems which have proved to have higher item/profile correlations than the earlier Loevinger stems substituted out (thus improving internal reliability overall). We also improved face/2nd-person validity by translating a lot of Loevinger’s titles and evaluative terms to more neutral/descriptive terms (e.g. ‘Conformist’ to ‘Diplomat’ [formerly 3, now 4 in the common numbering system]). We also developed the theoretical rationale and

work-related description of the Technician/Expert action-logic, which was the modal score among all our managerial samples (and was then an unnamed ¾ transition; now 5 in the common-numbering system). Later, we did the same for the Individualist/Pluralist [7] action-logic. All of these changes have been critical for the possibility of using the measure effectively and ethically in action research with co-participants in field settings, such as the research at the 10 companies summarized above.

Of course, validity testing of various kinds needs to, and is, continuing on the LDP. But I hope that the foregoing comments, as unsystematic as they are, arouse a new kind of interest in this particular measure, as well as in the broader issue of transforming the social sciences from pallid versions of the old-fashioned physical sciences that exercise ethically-objectionable unilateral power over subjects... into ethical forms of action research that empower co-participants and generate new forms of mutual and transforming power.

References (many of which can be found at the Boston College Faculty e-scholarship site, which is click-able from williamrtorbert.com)

Chandler, D. & Torbert, W. (2003). Transforming inquiry and action: By interweaving 27 flavors of action research. *Journal of Action Research*. 1, 133-152.

Cook-Greuter, S. (1999). *Postautonomous ego development: A study of its nature and measurement*, Unpublished doctoral dissertation, Cambridge MA: Harvard Graduate School of Education.

Fisher, D. & Torbert, W. (1991). Transforming managerial practice: Beyond the Achiever Stage, (pp143-173). In R. Woodman & W. Pasmore (Eds.). *Research in organization change and development*, vol. 5. Greenwich, CT: JAI Press.

Hartwell, J. & Torbert, W. (1999a). A group interview with Andy Wilson, Founder and CEO of Boston Duck Tours, and Massachusetts Entrepreneur of the Year. *Journal of Management Inquiry* 8, 2, 183-190, 1999.

Hartwell, J. & Torbert, W. (1999b). Analysis of the group interview with Andy Wilson: An Illustration of Interweaving First-, Second-, and Third-Person Research/Practice. With Jennifer Hartwell. *Journal of Management Inquiry* 8, 2, 191-204, 1999.

Liven-Tarandach, R. & Torbert, W. 2008. One test of the validity of the Harthill Leadership Development Profile. Unpublished, available from authors.

McCallum, D. (2008). Exploring the implications of a hidden diversity in group relations conference training: A developmental perspective. Unpublished doctoral dissertation: Columbia Teachers College, New York.

McCauley, C. Drath, W., Palus, C., O'Connor, P. & Baker, B. (2006). The use of constructive-developmental theory to advance the understanding of leadership. *The Leadership Quarterly*, 17, 634-653.

McGuire, J., Palus, C. & Torbert, W (2007). Toward interdependent organizing and researching. In A. Shani et al (Ed.s) *Handbook of Collaborative Management Research* (pp. 123 -142). Thousand Oak CA: Sage, 123-142.

Merron, K., Fisher, D., & Torbert, W. (1987). Meaning making and management action. *Group and Organizational Studies*. 12, 274-286.

Reason, P. & Torbert, W. (2001). Toward a transformational social science: A further look at the scientific merits of action research. *Concepts and Transformation*. 6(1), 1-37.

Rooke, D. & Torbert, W. (1998). Organizational transformation as a function of CEOs' developmental stage. *Organization Development Journal*. 16(1), 11-28.

Torbert, W. (1987). Education for organizational and community self-management. In S. Bruyn & J. Meehan (Ed.s) *Beyond Market and State*. Philadelphia PA: Temple University Press. 171-184.

Torbert, W. (1991). *The power of balance: Transforming self, society, and scientific inquiry*. Thousand Oaks CA: Sage.

Torbert, W. (1994). Cultivating post-formal development: higher stages and contrasting interventions. In M. Miller & S. Cook-Greuter (Ed.s), *Transcendence and Mature Thought in Adulthood*. Lanham MD: Rowman & Littlefield. 181-203.

Torbert, W. (2000a). A developmental approach to social science: A model for analyzing Charles Alexander's scientific contributions, *Journal of Adult Development*, 7, 255-267.

Torbert, W. (2000b). Transforming social science: Integrating quantitative, qualitative, and action research. In F. Sherman & W. Torbert (Eds). *Transforming social inquiry, transforming social action* (pp 67-92). Boston MA: Kluwer Academic Publishers.

Torbert, W. & D. Fisher (1992). Autobiographical awareness as a catalyst for managerial and organizational development. *Management Education and Development*, 23, 184-198.

Torbert, B. & Associates, (2004). *Action inquiry: The secret of timely and transforming leadership*. San Francisco CA: Berrett-Koehler.

Torbert, W., Livne-Tarandach, R., Herdman-Barker, E., Nicolaides, A., & McCallum, D. (2008). Developmental Action Inquiry: A distinct integral theory that integrates developmental theory, practice, and research in action. Paper delivered at August 2008 Integral Theory in Action Conference, JFK University, and forthcoming in book form.

Torbert, W., with John McGuire and Charles Palus. Toward interdependent organizing and researching. In A. Shani, S. Mohrman, W. Pasmore, B. Stymne & N. Adler (Eds) *Handbook of Collaborative Management Research*. New York: Sage, 2007.

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Reply from Zak Stein

RE: Reply to Torbert and frame-up for *Integral Review* readers.

My paper (with Katie Heikkinen.) in the current issue of *Integral Review* is, in part, a call for discourse and collaboration between researchers in developmental psychology concerning the validity and reliability of the metrics they use. Bill Torbert has been the first to respond to this call, and we are grateful for his thorough and insightful response, in particular his discussion of ecological validity. We hope his letter will not be the last and that others might take the peer-reviewed route, choosing to publish a more formal article in *Integral Review*. Nevertheless, the content of Bill's response is exactly the kind of thing we are looking for.

The story we tell in our paper is incomplete—as we note explicitly—and we offer it as simply the first word in a longer conversation, the goal of which is to inform a kind of information clearinghouse and educative resource about the wide variety of developmental approaches available (more on this below).

We will address the details of Torbert's response (and the responses of others) in a second publication to be written over the coming months. For now I will say, in passing, that developmental metrics can be divided into those *calibrated* for use in assessing individuals and those that have not been, and thus can only claim to be useful for research purposes. This is a distinction we explain in the paper, where we discuss the fact, for example, that Loevinger claimed that her metric was not reliable enough to be used in assessing individuals. The studies Torbert describes, although they provide evidence that developmental level predicts leader behavior—very important— provide no insight into whether or not the LDP is statistically reliable enough to justify its use in individual assessment.

When it comes to individual assessment, statistical reliability is a central concern, because it tells us how confident we can be that the score awarded to a performance is close to the test-taker's "true" score. For example, if a developmental assessment that is designed to measure 7 levels has a statistical reliability of .80, an individual who receives a score of 5 has a *true* score of 5, + or - 2 levels—somewhere between 3, and 7. The ideal statistical reliability for an instrument designed to detect 7 levels is .96. Even then, an individual who receives a score of 5 could have a true score between 4 and 6. (A research *instrument* with a reliability of .80 is good enough for studying group trends, but *assessments* are generally required to have reliabilities of .90+).

Of course, all assessments should measure (1) what they claim to measure (construct validity) and (2) something of importance (ecological validity), and human-scored assessments should also be associated with appropriate levels of inter-rater reliability, which must be continuously re-evaluated.

So this is the kind of difficult conversation we are trying to have—both technically/conceptually difficult and politically/emotionally difficult. The rest of this letter is an attempt to clarify why this conversation is important to have right now—why it is worth having despite its difficulty. I offer the following thoughts in order to clarify, as I did in *Integral Leadership Review*, the broader context that has me worried enough to take on the role of *l' enfant terrible*.

The United States has one of the largest and most complex educational systems in the world. This is a system that began to take in its current shape after the Second World War, influenced by a confluence of factors, including the birth of psychological testing. We now face a complex polycentric testing infrastructure that affects the lives of millions of children, adolescents, and adults every year. The sheer size and importance of this infrastructure makes it an unprecedented and incomparable example of applied psychology. But it is run by private companies providing a product that serves an irreplaceable public function in the educational system, which has led many to posit the specter of a *standardized testing industrial complex*. Moreover, the type, quality, and purposes of existing tests are highly

questionable. They are not built by developmentalists or learning scientists; they can function only as sorting mechanisms for allocating rewards or punishments; they set drastic constraints pedagogical options; and they are administered in high-stakes contexts, etc. And this testing infrastructure is continuing to grow.

The rapidly increasing complexity of our world has forced the educational system to expand vertically, where it has diversified greatly. The task demands of key roles in society are becoming increasingly steep, requiring life long learning, either in graduate school, through various professional development mechanisms, or through coaching/therapy, etc. In post-industrial economies, individuals must be educated longer and to higher levels, and some, depending on their role, can never stop learning. This new educational frontier is accompanied by a burgeoning testing infrastructure. Diverse applications of psychological testing are proliferating, serving a wide variety functions.

This emerging arena for applied psychology could begin to look a lot like the testing infrastructure that dominates the world of schooling. It has not yet become legally and institutionally entrenched, but it will. Accountability mechanisms will be extended to higher education. Industry and government will be forced by a host of global problems to see that all organizations need to build in sophisticated mechanisms for life-long learning and social role allocation.

In this light, the call for quality control becomes clear, I hope, as does the need for rigorous discussions about psychometrics. We need to be at least as rigorous—if not more rigorous—than the existing psychological testing juggernauts, if we are going to have any say in shaping the large scale application of psychological technologies.

I am leading specific efforts (along with Theo Dawson) at Harvard and elsewhere to re-design the testing infrastructure for the public education system. We are piloting new developmental testing infrastructures in a network of research school collaborations and working to stimulate discussion about testing in the public sphere (I invite you to participate in this initiative by taking The National Testing Survey at: www.testingsurvey.us).

My efforts in the field of adult development have been focused toward the Integral community (broadly defined), wherein there is a profound call for innovation in applied developmental psychology. My efforts have been mainly discursive so far. But the series of publications I have offered on this topic have consistently called for action. I am currently taking steps—with Katie Heikkinen, Sara Ross, Robb Smith and support from a network of academics, consultants, and psychologists—to build an information clearinghouse and educational resource about developmental approaches. This will be a website designed to foster collaboration and transparency between researchers, between researchers and the consultants (etc.) who buy their wares, and between researchers, consultants, and the public. The information will focus on reliability, validity, and the ethics of application. This project will take shape over the next 9 months, and I'll keep you posted via *Integral Review*.

As Dewey, Habermas, and Wilber have warned: non-synchronic patterns in socio-cultural development have resulted in a situation where our techno-scientific capabilities far outstrip our ethico-political visions and organization—21st century tools are wielded in light of 19th century (and in some cases 14th Century) ideology and government. This is a precarious situation. From where I sit—as a philosopher of education—this situation demands that we roll out the right kinds of psychological and educational technologies ASAP. We have a precious and fleeting chance to collectively build certain specific

structures that will shape the future; responsibility is paramount—as is a vision of what is possible and preferable.

All the best wishes from the pre-dawn hours in Carlisle, Massachusetts.

zak

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IR Editors News

Thomas Jordan

Grant for 3-year research project on The Integral Process for Complex Issues

Last December, we received the good news that a research grant application to the Swedish Knowledge Foundation for a 3-year project was approved, with a budget of about 500 thousand USD. The project title is From concerned citizens to effective societal entrepreneurs – Cognitive transformations and the role of scaffolding. Pia Andersson, now doctoral student at the Department of Work Science will carry out most of the work in the project. Dr. Thomas Jordan is the project leader, with dr. Ylva Mühlenbock and dr. Päivi Turunen as part-time co-researchers. Dr. Sara Ross, who developed TIP – The Integral Process for Complex Issues, will act as an advisor to the project. We will use TIP as the main instrument of investigation. The official description of the project is appended below.

The context of our project is societal entrepreneurs working with initiatives that involve a considerable degree of complexity and therefore difficulties in (1) understanding and managing complex processes; and (2) communicating productively with actors with different mindsets. A significant thematic concerns the challenges of working in multicultural settings.

The more research-oriented purpose of the project is to analyze the cognitive changes involved when people start to experience themselves as potentially competent societal entrepreneurs and when they develop skills in societal entrepreneurship. The more praxis-oriented purpose is to contribute to the development of methods (scaffolding modules) that facilitate skill- and confidence-building among prospective societal entrepreneurs. These general purposes are operationalized in seven specific research questions.

Our analytical framework is mainly based on adult development theory, using both qualitative and quantitative data. The main part of our project uses action research methodology, i.e. we as researchers-practitioners participate actively in co-facilitating inquiry and strategy-finding processes together with prospective societal entrepreneurs.

In the main study, we will collaborate with Hyresgästföreningen, the Swedish tenant's association. Hyresgästföreningen has recently initiated a three-year project ("Uppdrag M") focussing on the renewal of the "million programme" housing areas, the large suburbs built in the late 1960's and 1970's when Sweden went through a massive urbanization process. About a million flats were constructed in this national programme with mass production techniques, leading to areas with stereotypical high-rise

blocks. Hyresgästföreningen is keen on mobilizing and involving tenants in the renewal of these areas. A smaller part of the project uses a best-practice approach. We will, with the assistance of the the crime prevention council in Göteborg, identify five successful examples of societal entrepreneurship and use semi-structured interviews to generate data that will be analysed for patterns of cognitive change. The project design will generate different sets of empirical data. Participative observation, documented through journaling, will be a rich and open-ended source of qualitative data on process issues. Semi-structured interviews with process participants will be used in order to analyse whether significant transformations of the participants' constructions of various aspects of societal entrepreneurship occurred. Pre and post questionnaire assessments will generate quantifiable data on the perspectives and assumptions of the participants before and after the intervention.

The research team comprises five researchers from the disciplines of work science, public administration, social work, adult development psychology and conflict analysis. Three universities are involved: the Gothenburg, Dalarna and Antioch (USA) universities. For more info contact:

Pia Andersson: Pia.Andersson@av.gu.se

Thomas Jordan: thomas.jordan@av.gu.se

Tom Murray

Putting global warming aside for a moment (as if I could), I'm feeling grateful to have been born in this age of technological advancements. I ordered a DVD with the full set of audio recordings of presentations from the 2008 Integral Theory Conference, dropped it onto my iPod, and have been working my way through the whole conference in the last six months (in my car). Thanks to the prodigious efforts of the conference organizers, I can now attend multiple parallel sessions!

I have particularly enjoyed listening to the panels--lively discussions on integral approaches to subjects including Developmental Research, Environmentalism, Coaching, Education, Feminism, Politics, Psychotherapy, and Spirituality. These panel discussions are wonderful examples of the power of dialog and collectivity in knowledge building. Through the dynamic forces of interaction a quality of breadth, depth, diversity, and wisdom emerges from the whole that would hardly be possible from a single author or speaker, or from a non-interactive format. And it was hopeful to observe that the participants in these panels often exhibited characteristics of an "integral consciousness" such as: reflecting to their present internal physiological/emotional state, speaking to vulnerable elements of their psyche such as shadow, holding moments of silence with appreciation rather than awkwardness, and gracefully responding to alternative perspectives. It was not 100% so superlative, but compared to panels in other academic conferences, these were quite refreshing.

The panel on Integral Education was one of the things that inspired me to write the recently published IR article "What is the Integral in Integral Education? From Progressive Pedagogy to Integral Pedagogy," which allowed me to apply my understanding of integral theory, developed mostly over the last six years, to my decades-long work applying educational theories.

I continue to work on topics of dialog and collective processes, and enjoyed putting together a reference document "Tools for Dealing with Uncertainty, Ambiguity, and Paradox: Reflective Methods for Group Development" for a workshop I co-lead with Sara Ross and Jan Inglis at the National Conference on

Dialog and Deliberation. I'm also looking forward to participating this summer in both a New Generation Integral Activism retreat, and Next Step Integral's Integral Education Seminar, where at both venues I will be prototyping an activity to help participants gain a embodied felt sense of developmental levels as described in Spiral Dynamics and other theories.

Bonnitta Roy

I am looking forward to hosting the 2009 Integral Activism Strategic Vision Retreat at 'Alderlore' - our Connecticut farm/ home July 17th- 21st. This will allow me to develop a close and personal view of how activists are bringing forth integral ideas and putting them into practice. The retreat will be a small intergenerational gathering of people who are activists in grassroots organizing, social movement history, integral theory, whole systems thinking, nonviolent social change, anti-oppression, spiritual practices and community building. The retreat is being organized by Joshua Gorman (Generation Waking-Up) and Julia Walsh (Synthesis Rising) – two young leaders on the rise in the integral community.

Since January I have been working hard to post content on a new venture 'Integral Review of Books' to be hosted at integralreviewofbooks.com. Designed after the kind of extended-article reviews in The New York Review of Books, I hope to build a resource for contemporary works on or operating from an integral view – over the very diverse range of what "integral" signifies. The website is currently not active, but I have been writing an extended article about scalar relations and human action at the associated blog <http://integralreviewofbooks.wordpress.com>.

Russ Volckmann

Integral Leadership Review and **LeadingDigest** now have a home. In collaboration with Keith Bellamy and Sara Nora Ross we have incorporated Integral Publishers. At present we will be publishing two new lines: books and dissertations. We seek to provide a means for the voices of integrally informed authors to be heard more widely. Our draft of our purpose statement reads:

Integral Publishers is a 21st Century Enterprise whose fundamental purpose is to contribute to the common good. This will be achieved through the use of technology to foster dialogue and dissemination of integrally-informed ideas, concepts and experiences that enhance the development of individuals, organizations, societies and the planet as a whole.

IP is an attractor for all ideas that marry the wisdom of the past to the potential of the future. We give voice through traditional and emerging channels of communication to talent that speaks to all levels of development and to the beauty that each level brings. Our primary objective is to build an appreciation of humanity, society and world systems and to encourage them to thrive.

We will have a website soon. In the meanwhile, information on our publications can be found at <http://www.integralleadershipreview.com/integral-publishers-bookstore.php>. We now have six books:

- Volumes 1-3, **Insights on Leadership**
- Robert Rabbin, **A Mystic in Corporate America**
- Peter Merry, **Evolutionary Leadership**
- Jordan MacLeod, **New Currency**

Out first dissertation should be ready soon:

- Sara Nora Ross, ***Effects of a Structured Public Issues Discourse Method on the Complexity of Citizens' Reasoning and Local Political Development***

Other books and dissertations are in the pipeline.

We have unusual contracting arrangements with authors that provide considerably higher proportions of royalties to the authors than has been the custom in the publishing industry. We believe authors should be rewarded for their work.

An innovation (for us) on the ***Integral Leadership Review*** website is our streaming audio interviews with individuals like Jim Garrison, Michael Ben-Eli, Barbara Marx Hubbard and Don Beck. You can access these at <http://www.integralleadershipreview.com/mp3-interviews.php>.

On another note, I am serving on dissertation committees of PhD students drawing on integral theory at Antioch University, California Institute of Integral Studies, Fielding Graduate Institute, Institute for Transpersonal Psychology and Saybrook Institute. This year I am teaching about integral leadership at California Institute for Integral Studies, Saybrook Institute and Union Institute and University. Sara Nora Ross is joining me for the opening session with UI&U students in July.

Articles from Integral Leadership Review

Notes from the Field: A Gathering of Developmentalists

2009-10-01 12:10:33 Terri O'Fallon

Terri O'Fallon



The day was a bit misty, but despite the rain sixteen interested developmentalists from around the world rang the doorbell next to Bill Torbert's front door on October 3rd, 2009 to engage in a dialogue on developmental theory and its measurement. This meeting was sparked by an article in the Integral Review, "Models, Metrics, and Measurement in Developmental Psychology" written by Zak Stein and Katie Heikkinen. The Abstract to their article began and ended with:

Developmental psychology is currently used to measure psychological phenomena and by some, to re-design communities. While we generally support these uses, we are concerned about quality control standards guiding the production of usable knowledge in the discipline...We reveal a conspicuous lack of psychometric rigor on the part of some of the most popular developmental approaches and invite remedies for this situation.

Highlighted in the article was the Lectical Assessment System, (Dawson et al), the Subject Object Interview (Kegan) The Leadership Development Profile (Torbert et al) Spiral Dynamics (Graves), SCTi MAP (Cook-Greuter), Requisite Organization (Jaques) and the Hierarchical Complexity Scoring System (HCSS; Commons, et al.).

As a response to this critique, Bill Torbert sent an open invitation for anyone interested in exploring the article and developmentalism to a gathering in his home on October 3, 2009. A number of interested people responded but 16 were able to attend as concerned parties. Present were Aliko Nicolaidis, Elizabeth Debold, Jonah Freidman, Karen Yeyinmen, Sandra M. Martinez, David McCallum, Nancy Popp, Zachary Stein, Edward Kelly, Jackie Keeley, Nancy Wallis, Mary Stacey, Katie Heikkinen, Sara Nora Ross, Bill Torbert, and

Terri O'Fallon. Present by a letter offering was Susanne Cook-Greuter. Representatives of The Lectical Assessment System, the Subject Object Interview, the Leadership Developmental Profile, HCSS, and The SCTi MAP (MAP for short) were in attendance.

Early on in the introduction process, in which each person attending described their purpose in being there, Zak Stein put forth his concern that seemed to be a basis for much of the day—that is, his concern that we catalyze an information clearing house to assure ethical use of the developmental technologies that are available for the protection of consumers in a fashion similar to the clearing by the FDA of the bio-tech industry. His assertion was that, to get a holistic picture of somebody we need multiple measures, so it was his hope that there could be more collaboration and transparency between researchers and between researchers and consumers.

Several people supported Zak's concern. In addition, other intentions were revealed: How to access the first and second person perspective in the process of working with these inventories; the shared responsibilities we have as researchers and practitioners coming together; defining our terms so that we can adequately communicate with each other and the public; the "so what" of this process; concern about what it is that we can do to bring about a big shift; how can we work together so that we can all support each other in the development of all of our work and in the process serve consciousness; and an interest in wonder. Many people came to listen and learn.

Early in the conversation we began to unravel the differences between the various measures, including what we mean by the word "cognitive" since some of these approaches were thought of as cognitive approaches. Different definitions were expressed and as the conversation ensued from this exploration we began to untangle some of the differences between the represented inventories.

For example the LAS was described as disentangling the evaluative from the descriptive before they put them back together, whereas the MAP, the LDP, and the SOI were described as more integrative of the whole from the onset. The LAS was described as measuring performances on various lines of development, whereas the SOI, MAP and LDP were described more as a measure of a whole person relative to the particular focus of their scale. It was noted that two distinct language games are involved here: one about the quality of the empirical claims and another about how you justify the evaluations you are making of each person that are about their quality as a person.

Thus, it became clear early on that the purpose behind the use of a particular developmental inventory was of importance. An observation was made that one purpose seems to be to create a generalizable and justifiable third person measure (the LAS). Others seemed to be concerned with the understanding of the insides of a person's experience (SOI). So does the (MAP) while it also looks at behaviors and cognitive complexity. A further

focus was concerned with the form of development that actually comes out in action (Action Inquiry in conjunction with the LDP).

Time was set aside for those present representing the LAS, the SOI, the LDP and the MAP to further describe their approaches to measuring development. Out of this discussion, one fundamental difference seemed to surface: The LAS and HCSS are not based on the concept of a person having a center-of-gravity and the SCTi-MAP, the SOI and the LDP are. Therefore what is measured is essentially different.

A discussion ensued related to validity and reliability measures on several of the scales, large and smaller samples and other interests in the area of metrics, but this focus was held by the concern about appropriate ethics around the use of all developmental frames.

The biotech industry in the concrete world was compared with psychological technologies, which come from the world of the subtle. Because of increased demand to have people who can make decisions within the whirlwind of increased information glut, it was noted that there will be more and more demand for placing people, developmentally, in appropriate positions for making the required evaluations and assessments and decisions. Given this ballooning context it would be important to not let the market place dominate the flow of developmental services because this may be harmful to consumers.

Coming to a focus that we are all fundamentally on the same team—all looking at the same thing from different angles—we grappled with the recommendation that a community of concerned people develop standards to protect the consumer by looking at comparable institutes like ETS and AERA, and their guidelines for standards of best practices, through some form related to a clearing house or network.

It was proposed that a community of developmental academicians, researchers and practitioners come together and articulate principles for this network/clearing house and from that develop a set of standards. Setting up the right container to engender cooperation amongst us all for this effort was recognized. It would also be useful to find ways to catalyze metrics across these scales.

While this seemed to be a good first step, cautions also arose. While clearing houses could screen for ethical best practices that might include metrics, they also screen out certain options, some of which may be appropriate from later developmental levels, thus limiting choices of people, as the FDA does by not approving certain naturopathic approaches.

It was also noted that principles in and of themselves could reify our very efforts to the rigidity that we want to escape, that we might be aware of the importance of having a guiding evolutionary entity that would develop along with development itself. If we are at the frontier of human development,

having developmental theory helps us see how big a challenge this is. Most people think and act in a way that distort principles into their opposites, because they don't get enough feedback.

The day began and ended with a sense of good will, a collaborative air and a promise to meet again with this rare kind of active second person research spawned by Bill Torbert's invitation. . Sara Ross, publisher of the Integral Review invited articles on the day and on the reliability and validity testing of different measures for the December issue of IR.

Our work is just beginning. While the eyes of the world are focused at this time on more prominent areas than developmentalism, we are—by comparison—under the radar. This gives us the flexibility, the freedom, the option, the responsibility to develop something ethical, and creative for ourselves. We can start from the place of shaping ourselves with the kind of developmental level and focus that humanity will one day be holding prominent, so we don't want to repeat the siloing of our clearinghouse predecessors. □We want to learn from what they weren't able to see and work towards a model that is developmentally later than what we now have. This model will address how will humanity will be looking at what we did in 10, 20, or 100 years and what will we do in the design of our very models to serve humanity by imbedding development in them.

These are my own musings of that day of opening where 15 interested developmentalists made their first contact to engage with cooperation and good will.

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Attendees were:

Bill Torbert—A now retired Dean and professor at Boston College, Bill has authored several books, including co-authoring Action Inquiry. He co-authored a significant article in Harvard Business Review on the relationship between higher stages of development of CEOs and consultants and success in organizational transformation. He has consulted internationally and continues his consulting relationship with Harhill in the United Kingdom. He is a member of the Integral Leadership Council for Integral Leadership Review.

Elizabeth Debold—is a senior editor at EnlightenmentNext and co-author of Mother Daughter Revolution. She holds a Harvard PhD in Human Development and Psychology. She received her doctorate in Human Development and Psychology from Harvard University, and was a founding member of the Harvard Project on Women's Psychology and Girls' Development, which was directed by Dr. Carol Gilligan.

Aliki Nicolaidis—is a post doctoral Research Fellow for the Center for Institutional and Social Change She received her Ph.D. at Teachers College. Previously, she founded not-for-profit enterprises in Singapore to build the

capacity of women in leadership positions in government, non-profit and civil society sectors. She continues her work with emerging civic leaders in the United States and in the Middle East, working with practitioners and scholars in a variety of contexts.

Karen Yeyinmen—is a doctoral student at Harvard Graduate School of Education where she is studying adult transformational learning and leadership development. Her research is heavily informed by constructive-developmental and socio-cultural theoretic perspectives. She was Executive Vice President at TreeTop Technologies, Inc, a Information Services company.

Jonah D. Friedman—

Sandra M. Martinez—teaches at the United States Army War College and the Naval Postgraduate School. She co-authored a paper with Bill Torbert, “Timely Co-Generation and Sharing of Knowledge.” She currently lives and works outside of Tegucigalpa, Honduras.

David McCallum—is serving as assistant to the president of Le Moyne College in Syracuse, N.Y., and as visiting professor of Leadership studies in Le Moyne’s Management Division. In his research, David continues to explore the implications of developmental maturation for leaders as they face the challenges of organizational change processes. In his practice, he is involved with leadership capacity building for boards of trustees, faculties, and other groups. He also provides retreats exploring the implications of adult development for spiritual maturation.

Nancy Popp— is a developmental psychologist specializing in adult development. She did her graduate work in the '80s with Robert Kegan at Harvard and has become one of the foremost experts on the Subject-Object Interview, a measure developed by Kegan and colleagues to assess the complexity of an individual’s meaning-making. She continues to collaborate with Dr. Kegan on various projects.

Zachary Stein— received a B.A. in philosophy from Hampshire College in 2004 and an Ed.M. in Mind, Brain, and Education from the Harvard University Graduate School of Education in 2006. He is currently a student of philosophy and cognitive development pursuing a doctorate at Harvard. He is also the Senior Analyst for the Developmental Testing Service where has worked for years employing cognitive developmental models and metrics in a variety real world contexts (www.devtestservice.com). He has published in Integral Leadership Review.

Edward Kelly—

Jackie Keeley— holds first and post-graduate degrees from the University of Bath, most recently qualifying in Action Learning methodologies with the Centre for Action Research in Professional Practice. In 1985 Jackie co-

founded Harthill, building on her career as an independent consultant and her work at Roffey Park Management College. She is co-author of several papers and a contributing author to *Action Inquiry: The Secret of Timely and Transforming Leadership* (Berrett-Koehler, 2004).

Nancy Wallis— is Associate Dean for Curriculum and Program Delivery in the School of Human and Organizational Development at Fielding Graduate University. With a career as a scholar-practitioner, Dr. Wallis is committed to the study and practice of leadership that improves the quality of human lives, in small and large systems, in which personal and collective transformation are engaged, and where organizational goals are aligned with increasing social and economic justice. She serves on the Executive Committee of the Board of Directors of the Organizational Behavior Teaching Society (OBT S) and is a member of the Academy of Management. She presents regularly at the annual conferences associated with these organizations as well as at industry and client meetings.

Mary Stacey—Mary holds an MA in Organizational Leadership and Learning, a BA in psycholinguistics, and a diploma in counseling. She is a Newfield accredited coach and a member of the International Coaching Federation (ICF). She is a Founder and Managing Director of Context Management Consulting. Case studies of Mary's results are published in *The Change Handbook: The Definitive Resource on Today's Best Methods for Engaging Whole Systems* (Barrett-Koehler, 2007) and by the Information Management Forum (IMF, 2006). Her inquiry-based action learning program was designated an enterprise best practice by the CEO of Canadian Tire Corporation, Ltd. (2005).

Katie Heikkinen—is currently a doctoral candidate in the Human Development program at the Harvard Graduate School of Education, where her research focuses on the assessment of adult development, with a particular emphasis on Kurt Fischer's Skill Theory, Theo Dawson's Lectical Assessment System, and Robert Kegan's Subject-Object Interview. She is an alumni of Integral Institute and is currently on the faculty of the Integral Theory program at John F. Kennedy University. She has an article in this issue of *Integral Leadership Review*.

Terri O'Fallon—is a principal of Pacific Integral, her interests now lie in the living experiments of evolutionary systems design, adult levels of development and maturity, and the joys of ordinary living. She completed a PhD in Integral Studies and is a certified scorer of the Leadership Development Framework. She has published in *Integral Leadership Review*.

Sara Ross—is a founding partner in Integral Publishers, member of the Management Review Board of *Integral Leadership Review*, founder of the community action programs for ARINA, Inc. and founder of *Integral Review*, Sara was also the co-editor of a special issue of *World Futures* with Michael Commons on hierarchical complexity. Sara teaches and does research at Antioch University. She was interviewed in *Integral Leadership Review*.

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Terri O'Fallon, PhD, is a principal of Pacific Integral, whose focus is to

- 1 Develop support for the relief of suffering on our planet
2. Bring together people who are willing to experiment with new effective structures for realizing transformative change in evolutionary systems
3. Develop people in ways that will bring joy and wisdom into their midst through service.

Her interests now lie in the living experiments of evolutionary systems design, adult levels of development and maturity, and the joys of ordinary living.

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Transcript: Closing Conversation of the “Validity Day” Meeting at Bill Torbert’s, October 3, 2009

Introduction

After *Integral Review’s* (IR) publication of Stein and Heikkinen’s *Metrics, Models, and Measurement in Developmental Psychology* in June 2009, Bill Torbert submitted a spirited response to the article, which IR published in its July 2009 *Occasional Newsletter* (linked in this Special Section’s Table of Contents for reference). In that response, Bill included an invitation to all interested parties to convene at his home in the autumn to learn about and discuss the validity testing to which the Harthill Leadership Developmental Profile had been subjected over the years.

On October 3, 2009, 14 individuals joined Bill at his home at 138 Parker St, Newton, MA for the day-long meeting. Ten participants hailed from across the US, one individual flew in from Honduras, one from Canada, and two others arrived from Ireland and the UK. The meeting participants are listed below.

This document is the result of Bill’s suggestion near the end of the audio-recorded meeting that a transcript of the closing conversation be prepared and published in IR. With unanimous agreement of those present, that conversation is shared as a further contribution to the dialogue catalyzed by Stein and Heikkinen’s article.

The original meeting agenda, proposed by Bill to participants who confirmed attendance, is included below as a way to orient readers to the general tenor and content of the day’s discussions. From it flowed the transcribed closing conversation that follows below the list of participants.

“Validity Day” Meeting Agenda

11:00 – 11:10	Short meditation to bring us more fully into ourselves and one another’s company
11:10 – 12:00	3-minute introductions of ourselves and our current work/question
12:00 – 1:00	What is each of the three measures seeking to know about and predict (i.e., the Leadership Development Profile, the Subject-Object Interview, and Lectical Assessment)?
1:00 – 1:30	Lunch
1:30 – 3:30	What kinds of reliability and validity tests have been performed on and with each measure? (40 min. each)
3:30 – 3:45	Break
3:45 – 5:00	What kind of relationship between social inquiry and social action does the measure demonstrate?

Meeting Participants

The following were participants in this meeting, all of whom agreed to the use of audio recording and transcription. Speakers included below have reviewed and approved this transcript.

Elizabeth Debold, *EnlightenNext* Magazine
Jonah Freidman, Fordham University
Katie Heikkinen, Harvard School of Education
Jackie Keeley, Harthill Consulting Ltd., UK
Edward Kelly, of France and Ireland
Sandra M. Martinez, Cebrowski Institute, Naval Postgraduate School, Honduras
David McCallum, S.J., LeMoyne College
Aliko Nicolaides, Columbia University
Terri O'Fallon, Pacific Integral
Nancy Popp, Antioch University McGregor
Sara Nora Ross, *Integral Review* Journal
Mary Stacey, Managing Director, Context Management Consulting Inc.
Zachary Stein, Harvard School of Education; Developmental Testing Service, Inc.
Bill Torbert, Emeritus Professor, Boston College
Nancy Wallis, Fielding Graduate Institute
Karen Yeyinmen, Harvard School of Education

Transcript

Bill: [Referring to original agenda for this last hour of the day's conversation] I'm not sure it's quite the right question, but I think one of the questions that has been coming up is this question of how to influence things more widely in terms of larger systems and so forth, so that may be closer to our question at this point.

On the back of the page with Susanne's comment, I have an outline of my developmental model of social science, showing the underlying developmental action-logics of different ways of doing social science. Empirical positivism is an approach to social science that treats only objective, third-person knowledge as potentially valid. I have been aspiring towards a kind of social science I call Developmental Action Inquiry that attempts to interweave first-, second-, and third-person research. It's something that social science has not bothered to do yet and I think ought to. So, in a way, it's my answer to the question of—why am I so concerned about this action stuff? Well, because we all are, I think, and because the question that it seems to me we all ask ourselves—although very few of us ask it explicitly is: What action would be timely now? That seems to me to be the one question that is relevant all the time and yet, it's a question that social science, as we now know it, can't speak to at all, because it doesn't integrate first-, second-, and third-person research. Most third-person research attempts to be time-neutral and, therefore, has nothing to say to the question.

This was all in the service of talking about the larger paradigm out of which I thought my work was coming, but I don't think that's exactly the topic we want to discuss right now. What do you say? Let's try something harder—like finding the question we want to discuss.

Sandra: Drawing on what you've said, I've had several conversations with people about how we—it was Sara, and Jackie, you mentioned this too...about how we might want to talk about what we share in terms of the transformation we're trying to enact or support at a higher level, at an institutional level. Perhaps we could discuss how we can support one another and how we might weave this discussion into the type of conversation we want to have about validity.

Bill: Right, and that relates to the sort of clearinghouse/network question, maybe.

Jonah: I suppose the question that comes up for me is hearing because three of you worked in, in some sense, this intervention or ambush or hearing, or wanting to hear, or are really, really curious about what we can hear together because I was very curious to hear from you also what you may have heard in your time here, perhaps what you might not have thought you were coming to hear.

Bill: Which three are you thinking of? Sort of the complexity people?

[Laughter]

Bill: I think you will have identified them as a unit.[referring to Zak, Katie, and Sara, because they share a common theoretical foundation of Hierarchical Complexity theory]

Jonah: Probably, you helped to invite us to be itself a possibility by writing the article, which was an invitation. So, in a sense, you walked into it and we walked into it by virtue of your intention, too. I'd be curious and certainly am curious.

Sara: One question that was floating in me right before you started to speak was, "What does the field of practice need from the theory side?" That's a question I'm sitting with and that's certainly related to my earlier motivation last year to suggest we need some kind of Institute of Applied Developmental Theory. But I'm just wondering in the light of the conversations today, from the praxis standpoint—is anything arising? What does the field of practice need from theory?

Elizabeth: Do you mean theory or do you mean metrics?

Sara: No, I mean from developmental theory. Yes, seeing metrics as the instrumentation of theory, but that wasn't where I was going. I guess one reason I'm asking that is related to something I said earlier about the need I see, at least, but maybe it's not something that's really a need, of distinguishing among—if we're going to choose metrics, if we're going to choose instruments, if we're going to choose intervention measures and methods and other process methods, what do we need practically to help us distinguish doing what?

Do we want to organize our thinking around someone's center of gravity or someone's performance or someone's behaviors typically in a certain domain? What kind of constructs, maybe, is what I'm asking, does the field of practice need from the theory side to help make things more useful?

David: To join you with that, it feels like we need to co-generate some new principles for both the research and the application. I was thinking about it in terms of, in many professions, there are codes of conduct and practice that are really thoughtful, reflective. People come up with them consensually and they're ways of establishing these guidelines for how we use technologies and techniques. That would be an interesting conversation to begin to sort of roll out, and it is happening. The idea of the Integral Metrological Pluralism, Bob Kegan's thinking, talking about it's not people here in terms of what we're trying to assess, but something more intangible, Susanne's, I think, concerns are the concerns about seeing people in a variety of contexts. There are a number of things already on the table that help us to shape our thinking around how this material should be used responsibly. I have energy around that, too, and I don't know if you feel the same way.

Jonah: I guess I'm curious to go back to you guys, in that. In a sense, you are going to go back and take away from here something. You came to here with something, we love it and we hopefully brought something to the table, to the floor or circle also, but in a sense, you're going back also with a variety of tasks that you've set in place. I guess I'm hoping perhaps or asking if you could share a part of that, as it were, to pre-reflect or to engage us with it, if it's possible.

Zak: I guess I'm not feeling that kind of us-them kind of thing.

Jonah: I don't mean to cast it in that way, but it's probably set up by what I call our being here by response.

Zak: Yes. Coming here was funny because it was like you're [Bill] inviting me over because you are going to yell at me about this. [Laughter] He's gonna color me counter dependent-antagonistic, yeah, I had issues with my father but you don't look like him very much. [laughter]

Bill: I'm glad we got that straight.

Zak: To be here, we're all really so fundamentally on the same team here and that's the thing. I guess for me, what I'm taking away is what can we really do? Is it a matter of like a special section of *Integral Review* where we tried our best to get, for example, Bob and we'll get Theo. We'll try to get everyone in there to make a unified statement, of course, with different perspectives, with different details about the fact that, "Listen, all the experts in this field are concerned about the way we're rolling these things out. Let's be more concerned." That would be the first step.

I'm looking more for action steps after this. What should we really do here? What would be the best place to put our energies to have positive outward ramifications? But at

the same time, I think I'm realistic about what could be done. I don't think that we can affect the everyday language that people use in the communities that surround these things in the immediate near future. I think that is going to be a longer term project where we as—for the lack of a term—professionals model more sophisticated ways of talking about this. That is what I'm coming away with. There's a sense that yes, we're all trying to do the right thing here and we're all really, I think, even theoretically from a psychometric perspective, I think we're all really looking at the same thing from different angles. That's part of my dissertation work is to show that. It's to show that there is this thing out there that's like weight. We've been going at it from all these different angles, and you know, for some purposes, a scale is fine; for other purposes, you need literally down to the microgram. So, yes, I guess I'm just feeling a sense of unity, but also just concern of all of, okay, now, what are we going to do? What more should we do? Along these lines of what would be if we decide, "All right, let's do this, not a clearinghouse but more like a group of concerned people coming together to articulate standards of practice." What would they really be? I don't think it's going to be, "Everything needs to be [reliability of] 0.96." I don't think it's going to be lines like that. If you look at comparable institutions like the American Psychological Association and Educational Research—I forgot the acronym—anyway, they've got this nice...

Sara: A-E-R-A.

Zak: Yes, AERA. They've got this nice little booklet. I cited it in the paper. They're just standards for educational measurements and they don't drop any numbers or any statistics, but they give all of these guidelines for best practices and about different kinds of validity and how to make those things and they're talking about regular old educational assessment things, not developmental assessments. And so I think that there's maybe some need for something like that.

Sara: Yes, and the different categories we find ourselves, the assessment domain and your interests there are not like my interests. Mine are different. But still, we have different kinds of assessment interests and it's not one thing we're talking about and we have different kinds of consultation and coaching, other kinds of organizational research. I mean, there's a whole bunch of different categories here because developmental stuff crosscuts. There isn't anything that doesn't fit under something we might want to pay attention to, it's crosscutting. So I think it could end up being kind of a good idea of standards, principles, attractive to me as a starting place, if nothing else to raise attention that we need to be paying attention to such things. And practitioners need to be supported, not everybody will ever be a specialist in this. We could never expect it, so what kind of support do we offer those who aren't going to specialize, but really can use this to benefit others?

Woman: Is there a best practices in terms of using assessments in different contexts that would...

Sara: That's what I think we need to create. That's my sense if something comes up and I'm sure we could draw from things like the APA and therapeutics...

Zak: That's what that got me. I mean it says—for using tests and organizational environments, for using tests for high stake decisions, for using tests for this. They specify different contexts and they talk about proper and improper usage, and it is. It was a committee of many, many people. It's interesting book. It's worth looking at. In a way, we could fold into that.

I was also thinking of other things. So there's that, but I was also thinking we need to find ways to catalyze research and cross metric comparison research, cross-model research, because these things are evolving. Ten years from now, if we're having exactly the same conversation, then we failed. We need to be talking about these new metrics and improvements that come from the cross fertilization and the multiple perspectives. So that's another thing that we were thinking about and that's the idea of the clearinghouse, I see now, I always thought of it as also a collaboration space, a space so we all know what one another is doing with the research and then it would be easier to see if we have relevant data sets that overlap or something like that. Not so much to bring unity to the field, but to make it a field where everyone knows what everyone else is doing.

Sara: A community of inquiry?

Zak: Yes.

[laughter]

Bill: My goodness...

Sandra: I'm just thinking about what you said. If we share enough, we could articulate a certain set of principles and then eventually cascade down from these principles to develop standards of practice. We can refine and modify these principles. However, at this stage, the objective would be to develop a common language. I like the idea of starting with principles because they are at a higher level of abstraction. Perhaps we, as a group, could articulate a set of principles that we could all commit to and that is sufficiently general to cover all our areas of interest. I'm drawing from what you said. After developing the principles, we could then begin to develop standards or behavior.

Sara: Yes, and we might want to move them up and down because sometimes what we call "principles" aren't technically principles at all, but we might really want them to be high level principles, so we could really do a lot of action inquiry around that.

Terri: And understanding that anything we have as a principle could easily be reified into something very concrete and not evolving, then they could be applied to support very concrete processes and behaviors and then as a result not evolve. This is one of the concerns I have.

Sara: I agree. And I think we can be really careful about how we define them, and how we look at what *is* a principle because sometimes what people call principles really aren't.

Instead, they're very reifiable things that really aren't in the principle category. So, I think we could bring some elegance to it that way, and avoid what you're worried about.

Zak: Hopefully, if we define it, whatever it becomes, so it's a living document. It's a living agreement. But that's easier to say than actually pull off.

Bill: Yes. Donald Campbell's law of invalidity—the more people start paying attention to it, the more it will get distorted. So, it requires an institution that is capable of double-loop and triple-loop change and who's going to start that one?

[Laughter]

Elizabeth: What would you propose as an alternative? If we're looking at an action to take to move forward, what would be...?

Bill: I'm just trying to hide. I'm not trying to say it's not a good idea, but in a sense, joining Terri in her concern and I'm trying to emphasize that, in a sense, that was Dostoevsky's thing about the Inquisition, you know, in the name of Jesus, the Inquisition re-crucifies Jesus at his second coming. You know, our institutions tend to turn into the opposite of what they were meant to be. I thought banks were supposed to keep us financially safe—oh, haven't they been doing that recently?

Elizabeth: I share the same concern.

Bill: Yes, but we're at the frontier of human development, generally, in trying to do this, so having a developmental theory helps us, perhaps, recognize just how big the challenge is because most people think and act in ways that are likely to distort principles into their opposites, because they won't receive enough feedback to adjust.

Edward: Perhaps then, just given that everybody, lots of you have highlighted how language trips everybody into—I mean, so when I hear "applied" I trip off into something, when I hear "principles" I trip off into something. And yet, I support the collective need for understanding of what each of us are doing. I just think it's been wonderful to get the sharing of different perspectives today. It advances things hugely in such a short time because perhaps we're putting similarities and differences out there and we have to realize lots of stuff. Going forward then, maybe, we just have to try and find some other words to ...

Sara: How would you say what you would want? How would you like...

Edward: I would start with almost the same format again on a bi-annual, quarterly kind of get-together. It wouldn't be exclusive to this particular group of people or particular models, metrics, theoretical approaches that were put up. Presumably it's something that comes under the umbrella of developmental theory, practice, metrics, whatever. Most of my knowledge is in the LDP. I'd like to spend more time on the subject-object and I'd like to spend more time on the LAS... I'd like to get this sort of inside hermeneutical

perspective that you have [looking at Zak], so that I'm not reducing what I hear from you to what I already know from my side.

Sandra: How do we do that?

Edward: I'd like to try that. I don't know how we do that. I'd like to become Zak for a day so I can see what you're saying because and likewise, to get inside...

Bill: Is there a movie about that man?

Edward: Say you push me to something. So, that's sort of what I thinking.

Zak: I like this idea of a bi-annual thing maybe, and maybe under this Institute of Applied Developmental Psychology, but there are some folks that are not in this room who should be in the room. The Spiral Dynamics team, the Elliot Jaques' group...

Bill: Yes, and Bob [Kegan] and Lisa [Lahey].

Zak: Yes, individuals but also whole groups that aren't represented.

Aliki: I'm wondering. There are a couple of research possibilities, studies that have been initiated, like for instance, the one that JFK, the one that potentially you might win. I got to wondering if there is now an opportunity to create some permeability or a study to include some of these other alternative modalities and why not engage them and decide actions to join this kind of project. I don't know if there's space within the research initiatives that you're all involved in or maybe one that can be sponsored through one of the universities that are being represented in the room here, but that might be something to take our action more quickly into action. There are some opportunities here, here in the LDP as an additional inventory that gets used or bring in the SCTI MAP as an additional inventory. Why not, if you can?

Sandra: Yes.

Elizabeth: We're hoping to be able to start to look at data together between the people who have created the metrics and be able to say, "Okay. Look at how these things are varying or how they're working together," and begin to really start to have a conversation about this together. We were hoping to get funding for that next year to really start an inquiry and do it. *EnlightenNext* is going to be putting on conferences annually and that would be part of the conference agenda for that year.

When we initiated the idea, we had such a strong response from all around the world—people in Australia, saying, "I need to know. We need to know. We need to do something about this. We need to be clear about what we're talking about together and how this thing's working." That's one thing—that there's a forum that's going to come into existence to understand the relationship between these metrics and the theoretical

assumptions that they are based on. There's also the JFK Integral Theory Conference that will be meeting every other year; this could be a module in that conference.

Zak: I know they're planning panels on a lot of the issues that we talked about it today. The issue of funding, I think, is key because as much as I'd love to pursue these things...

Elizabeth: I know. I know.

Zak: It's like time and money are really bottlenecks and I tell them one thing we can think about is somehow pursuing some kind of funding source for research.

Elizabeth: I also like the idea of doing a special issue of the *Integral Review*.

Bill: I guess it's being done, right? For January, I mean, that's why...

Sara: Yes, the next issue—the regular issue will be in December, and presumably, everybody on the list like Bob Kegan (don't know if he responded directly), Michael Commons, Susanne, whoever wants to respond directly, to have the more formal or informal whatever kind of piece, whether peer reviewed or editorially reviewed format to respond to Zak's and your [Bill's] response, which we put in the newsletter. There's not going to be a special issue dedicated to that because of course we don't know how many will actually produce. Of course, anyone from here is more than welcome to contribute anything from just a reflective essay on what was today like, to something more elaborate or any other kind of—join the discourse about the whole subject from your perspective.

Bill: Yes. Tom Murray emailed me about this, this week, said he'd like to have a tape and so, I think he somehow wants to use this...so I guess I'm assuming, but I shouldn't assume that we could share this with him.

Sara: Is that okay with you guys?

Murmurs: Sure.

Bill: That's where the request originally came from actually. I think that is a good opportunity when a number of us see ourselves. I mean look at what it does when somebody puts something in print that gets you all over-excited.

Sandra: I think it's quite amazing that we all gathered here from different continents. It's really a privilege to talk to everyone here. I hope we can continue it.

Bill: Absolutely.

Aliki: I do want to second the idea, or maybe it's the third or fifth "second" of the idea by now, the idea that maybe, there is a way that we can create some sort of an inquiry conversation that happens again in this configuration and others where we then focus the next conversation on principles, let's say. We're going to use the day to come up with

some of these notions and then, in between some of these publications, the IR [*Integral Review*], this keeping each other abreast of each other's research or ways to stay in relationship and in between the convening. I like that idea. I have a lot of energy around that.

Zak: I like it too, I mean, what was unique about this was that it was such a dialogue and there was so much reciprocity and I feel like it's hard to get that in academic discourse situations.

[laughter]

Sara: Even in just a discussion forum on the internet.

Zak: Exactly. So we'd have to create the right container. The fact that this was so personal, and I think, it really helps—and kudos for setting it up and Bill, you opening your home to us...

Bill: Good sandwiches...

Zak: Yes, yes. I wanted it to happen, but what I don't want to happen is that it turns into a conference situation where people are taking sides and it's just like, "All right. We didn't do anything." I feel like here, we're doing something and I don't know how to make that happen if it gets bigger I guess.

Elizabeth: Well, it seems like we are saying, "Let's make a commitment to the process of trying to understand each other in the theories and humanity, people in general." It is the process that we're committed to, the evolution of development and all that.

Woman: I don't want to advocate for formalizing this. I was just more interested in maybe bringing another friend who happens to represent another view to sit next to one of us and have that add to the conversation as opposed to having maybe, Michael Commons come and Bob Kegan, and I don't know, whoever else there is.

David: Although if they could—wonderful, because I think that there's a kind of weight about having the sort of spokespeople of these different lineages of development. That does have a certain cache in a larger field. We've got a lot of Experts and Achievers who are picking up these paradigms and using them in pretty instrumental ways. It makes a difference when you have certain names on the flag-staff. But wouldn't it be good to have a weekend where we can have a "Flex Flow" structure for the weekends and good food, nice drink, good clean water, and spend some time basically having this kind of conversation. That would be very nice.

Mary: I'd like to go back to that practitioner question that you asked. I think, from a practitioner's perspective, I would ask that you keep the spirit of dialogue alive when you're going to your writing and your publishing, because we depend so much on it to stay current. We have so much translation and bridging work to do and need to depend on

you to have had various conversations. When I read [the article]—I guess it was June, I was distressed. In the LDP I'd found something I could take into business and the language was close enough. I had this huge "Oh, shit" moment that I think has been addressed in being able to sit in on this conversation. My request is that you keep the spirit of dialogue alive when you're going into those other ways of communicating.

Elizabeth: May I ask? Are you asking for the language to be more accessible or are you just asking for there to be a more conversational way of engaging with these questions...

Mary: I'm making the distinction between myself as a practitioner and some of you as academics, I'm asking you to create dialogue in other contexts as you're writing, as you're publishing in journals and what-not. I'm back to my first, "What's the responsibility we uphold to be in dialogue, be in a conversation before we 'go out'" because it's just so important for us as practitioners to be able to trust, to be very literate, and to be willing to do the translation work that we do.

Sara: It's a huge burden, that practitioners share—because some of us are both—to be so multilingual across theories. I mean, it's a lot.

Mary: Let's help each other avoid the "Oh, shit" moment.

Sara: What were you referring to? What was the "oh, shit" moment?

Mary: It was reading the journal article in June [Stein & Heikkinen] and realizing that this measure that I've invested in, had taken into my company and out my clients, was being questioned in such a clear way and I couldn't really read into it what that meant.

Bill: "I'm using the LDP and they decided it has no validity."

Mary: It's just more about this spirit that's living here today and I think it's probably expanded and I just wanted to highlight it.

Edward: Has that only happened to you once in the last year?

[laughter]

Mary: If we can spare each other those moments, then let's do it.

Jackie: What that makes me think about is how not to rarify the conversation and to somehow find ways to bring in the voices of the people with whom we're actually working with these measures and the different ways there might be of bringing it to them. How can we get their experiences back into the process so that we know that what we're doing is making sense to them and giving them some value in their lives? I don't know how will you do that, but it seems to me that would add another level, another important voice, another person into the research. So that, I think, is speaking more toward what you're

saying, Mary — in a way, what could we do to contribute to the ongoing conversation, but do it from a practitioner's point of view?

Sara: That gives me an idea for a book. [Laughter] Seriously. A practitioner book everyone could contribute to with their...

Woman: Right, and the stories are neat. My client is resisting doing what we would all say is suggested.

Jackie: Of course. When you think about doing it in Russia, you've got all of that complexity we were talking about in the beginning and what impact does that have on the situation?

Sandra: I think we've been terribly collaborative. I didn't know what to expect of this dialogue today, but it could have turned out differently and I think that it is reflective of who we are personally and how we work. I'm hearing that you want it to be open and inclusive and collaborative. Maybe I'm reading this into it, but this is how I'm interpreting what I am hearing.

Terri: I'm appreciating the quality of the conversation, the dialogue and the intention behind it all today. It feels very alive to me and I'm encouraging that as everybody goes off in disparate ways and to their own work. This kind of spirit can be infused there, too.

Nancy P: Instead of going back to our own camps and just writing about...[Crosstalk]

Terri: If I were with that corporate client, we'd be talking about silos and cross-fertilization. What clients (and we) can learn is, "I can pick up the phone and talk to this guy first before we make our critiques public." Just keep the spirit we have here moving into the practitioner's circles.

Zak: I started us all off making this comparison to biotech and I made this argument that I think psychological technologies is a growth industry. I think we may be underestimating the demand that is going to be arising in the next decade or so, surrounding organizational change and the assessment of human capabilities, I mean, there's a long literature on it, take Daniel Bell's *The Coming of Post-Industrial Society*, where he basically prophesizes that in the near future it's not going to be the ins and outs of industrial technology we are going to worry about, it's going to be the motivational and capability systems of employees that are going to start to be the main problem in information societies, post-industrial societies and I think that's where we're about to be. Look at Google. That's a five-year shabam and all of a sudden it's too much information for everybody. We're just in decision-making crisis after decision-making crisis. And at some point, people are going to start to realize that, "Oh, yeah, there are these developmental psychologists who've been worrying about this already for two decades." The reason I like the fact that we're having this conversation is that we can't let the market mechanisms hold sway here.

We need to keep an eye on the ethical prizes, which are to evolve consciousness and cultivate the broadest, deepest humanity we can. In the beginning of the biotech thing, they would never have the thought that you'd be getting a bunch of these companies together, because they'd be sharing trade secrets with one another. We're in the opposite position. Where we want to learn from one another, so that we can reciprocally make one another stronger. I think if we can keep that, then there's a potential for this to do a lot more good than it would otherwise do if we factionated, and compete as opposed to collaborate.

Sara: And I think what evolutionary potential is, is that if there's anything ailing us in general, societally, globally, is how fractured, how compartmentalized we are... If this field finally gets out there a unified understanding of the organism as a whole. I mean, a fractured field does no good in that respect. But we're positioned well with all these different windows and time horizons—we're really well-positioned to disseminate and operationalize much more holistic understandings of whole human beings, so I think that we have a lot of important work to do there, too.

Zak: It's critical. We need to show—and this is my 1984 hat that I'll wear now—we need to show that people can transform without invasive biomedical interventions. Because that is where we're going. All the work that I do in the field of Mind, Brain and Education, is primarily about that. I'm saying, "Stop. Don't just give the kid a Ritalin, worry about the institutional norms that are interfacing with this biology, not just this biology."

We need to have ways of showing that people can transform because it's clear people are needing to transform. We face epidemics of psychological disorders, of depression and "hyper-activity" and these kinds of things. And the way our cultural mores are, we say, "Just give me the med." And it's going to be different now. And that trend will increase. There are these intracranial stimulations. I mean they're going to do that. So I feel a sense of urgency. But I can only make so many arguments to these folks about... "This is unethical." Right. Then they say, "Well, what else are you going to do, buddy?" I went to a meeting of the Neural Information Processing Systems Society, and it was frightening. These were the most rampant reductionistic guys. And they are getting endless funding. There's an urgency here to show that we can do this as psychologists; we can do this by changing people, their action patterns and the way they speak and all of these things.

Karen: I think your question about funding is really important, too, because my husband's in biotech. He was working for a biotech start-up for a while that was working on early stage drug development. They weren't worried about bringing the drug to market. They wanted to come up with early-stage compounds that could go into the pipeline to be ultimately developed. They had trouble coming up with their second round of funding because whenever they went to the investment community, the investors would say, "This is exactly what we need because the industry is drying up." We have these certain compounds and they've been used and used and used to death. Everyone's trying to take those same things and bring them to market differently because that's where the money is. People—it's like low-risk, high pay-off, whatnot and this is really high risk; but it's

what's needed by the industry but there's no funding to support that even though that's what's needed. There seems to me it's interesting that you pick the biotech industry as a comparison because I wonder what else can we learn from what's going on there about what we don't want to do and this connection between where the funds are going being different from what's needed. How do you shift that? Where is the value proposition to the funders?

Zak: And it's comparable at multiple levels because there's one foot in the academy, one foot in industry-type of thing where high level knowledge and work with big-time effects on society. It's true. Biotech is at a plateau, more or less. We crack the genome when we thought we could find all its secrets. The truth is that we don't know. I think that this next thing is going to be just like biological technologies and we need to get a handle the quality control there. The FDA is a terrible example, setting standards. I think that we need to worry about quality control and to learn lessons from biotech.

Nancy P: I think we also need your point about giving a kid Ritalin is reminding me that, I think, a lot of fragmentation is that we're taking people and parts of people out of context. We're separating the kid from the environment and saying, "Okay, this is the behavior. Let's fix the behavior when they're not looking." One of the big problems with medical doctors is you go in, they're treating you like a bundle of symptoms rather than a whole person, so it's picking things apart and forgetting the context of the whole person within their environment. To me, that seems like a really crucial thing to keep bringing this back to this—what's the context?

Elizabeth: That's the structure of mind and consciousness at a developmental level. It's a really interesting thing because the ethical and moral demand of our time and of our profession is something that is way ahead of the normative curve where the culture is and where these decisions are being made. I appreciate your bringing in the transhumanist dimension of how development is going to happen because we've got all these achievers, if you will—there are so many different terms for that level—who are saying that we need to evolve, that human beings need to evolve and the best and fastest way to do it is through this medical and technological drug intervention. We need to actually broaden our horizons to see this as part of the developmental world even though it is not what we're about at all. But that is actually the marketplace, if you will, that we're competing in.

David: It's the modal developmental level at which this stuff is being instrumentalized.

Elizabeth: Exactly, and being understood. That's a very interesting thing for us as practitioners and researchers. Where are the places for intervention? What is it that we need to demonstrate? How do we move this forward to the culture in a way that is going to have an effect so that enough leadership decision-making is happening at a different order of thought rather than this? There's a heck of a lot of money to be made in it and that's the modal developmental level.

Zak: The psychometrics are integrated. The statistical diagnostic manual, I mean, the DSM. That's the IQ psychometrics and the whole rhythm of things is tied to this testing industry. There are so many places to push to make things shift, and so...

Sandra: I hope you articulate your arguments in this article because I think...

Bill: I was thinking actually, a little edited version of this conversation could be in the [*Integral Review*] journal because it catches the liveliness and some really important, powerful things have been said here in the last five minutes.

Sandra: The specific arguments that you have recently made, Zak, are critical. I believe it is important to articulate your arguments well and, in your comparison of growth in the biotech and the burgeoning developmental assessment industry, to illustrate how solutions for developmental issues are being sought in certain technologies divorced from a concern and appreciation for human development. Secondly, to a certain degree you need financial clout and backing to gain legitimacy. If part of acquiring legitimacy is getting financial support from a large agency for a large-scale study, maybe we could individually think about what that study could be and who would support it.

Terri: Also, thinking years down the road, when we are in this place where we're no longer in the biological money-making business of biotech, but we're in the psychological money-making business—so, psychological tech—are we going to become siloed again and have the same mindset towards our money-making as the biotech does now? Are we going to actually remain in a community where we're not looking at ourselves; how we can be political about psychology? So... this is something I feel so concerned about. I'm really here with the heart of knowing that everybody has pieces of humanity's puzzle and no one has all of them. If we can work together in a proper way, everybody will flourish, but coming out of the silos to re-silo again is not going to be the answer here. I'm personally going to make a commitment not to fall back into that again, which could easily happen. That's something to think about.

Jackie: This is a very specific challenge and this is about silos because being published in the *Integral Review* and all of the places that we all know and love to read is one thing, but that's actually, a really tiny little bit of who's paying any attention. We're paying attention to what we're paying attention to know. We don't know who else is out there.

Bill: We are the readership!

[laughter]

Jackie: Yes. So I can try to think about this for UK, for instance, but then, I don't know where I'd look to get something published. Where else could you get published in the US that would widen the audience? It seems to me like a really important question and turn to thinking about going down to this root.

Zak: I can tell you that I edit a special section of the Journal for *Mind, Brain and Education* which is an award winning journal. It's got a wide dissemination and it's funded by Blackwell. It's a major mainstream academic journal. I would welcome any submissions about any of this kind of stuff—this research-practice thing, the multiple models of development thing and again, the educational aspects would be relevant for that journal. I like the idea of pushing into the mainstream academic journals with this stuff, but the truth is many important readers are not from mainstream academics.

Woman: Yes, exactly.

Zak: My articles that are published in *Integral Review*, I think, more people read those than the ones that I publish in *New Ideas in Psychology*, or *Journal of Philosophy of Education*, or things like that. I mean the academy is fragmented and siloed. There are so many people publishing so much crap and the question of where to say something, where it matters that you said it, I think, is a core question. I really don't know.

David: Part of leadership is getting people to pay attention to the right things, so how do you catch the attention of the right folks? Oprah has a very skillful way of doing this, doesn't she?

[laughter]

Karen: It is a classic adaptive challenge. How do we get this set of stakeholders? Who are the set of stakeholders? What is the work? What is it that we're trying to do? I think we've captured some of that here, but in the Heifetz model you start by defining the work. What is it that we do agree we're trying to do? I think there's been some of it out there today. Then, who has a perspective on that thing? What are those perspectives and what do they have to lose if we were to achieve that thing? So then, let's start maybe there...

Elizabeth: What's interesting is that when you shift the focus away from "Here we are together with competing measures" or "Here we are together trying to come to an understanding of how we assess and what we mean by development" to the larger questions. It gives us even more ground for unity. We're all together in not wanting a certain future to arise. We all want, as Terri said, to serve consciousness and are very concerned whether consciousness development can happen in a context that is materialistic and that we perceive as dangerous to the larger whole that we're all a part. It's an interesting re-frame that enables you see the problem in a different way. And therefore, our unity becomes more rich and tangible. But then, what is the action step that will make that mean something?

Bill: I was really somehow particularly struck when you said, Zak, about ten minutes ago, you know, I've tried to do this all my life, but I just heard it for the first time. We're trying to make transformation a real possibility for people and that is so different from incremental change. It's driven by a completely different form of power—for me, at least. It does indeed have to be mutual; and that, in turn, prioritizes the second-person present form of research, which is the form we've been conducting today. Instead of somebody

coming in and telling everybody else what's going on, we're here trying to keep the questions in the center.

It just comes back to what you were saying, Mary. That explains why it's so important to keep this spirit going because it's really the only spirit that supports transformation. None of us could have forced any of the rest of us to care about our stuff, and we didn't go about it that way, so it worked today. But that's not the way academic discourse usually moves. I'm just putting together why it is so important to keep this element of it. That's of course part of what needs to be highlighted: the centrality of an active community of inquiry. It seems obvious because that phrase comes from academics, though it never applies it to itself in the real way [laughter] but it's what's true in a corporation too, right now. For them to survive and transform, they need to have an active community of inquiry. These boards of directors that rubberstamp things is what got us into the last two years. So, in a way, this is a question which is not only true for us as developmentalists—although maybe, it's hyper, hyper-true for us, really, *we* ought to be the ones who got it—but it's also what is a societally-needed form of activity. Part of our action is actually in doing this but then, how does it get, as you were saying, how do we get other people to see that?

I'm just being helped to get myself to rewrite this old book of mine, *The Power of Balance*. And the new title is *When Will We Discover our Mutually Transforming Powers?* It is meant to speak to a lot of different kinds of people, so, maybe, that can play a role, too. Certainly, everything I've heard today is getting siphoned into my thinking about how to revise the book and make it more accessible.

Terri: One of the things I appreciate, in a way, is that typically the whole world has their eyes riveted on certain popular places and tantalizing ideas and then there's the common sidewalk with the obscure dandelion tentatively growing, spreading its little seeds everywhere, being under the radar kind of like we may be here—since we aren't in the spotlight it does give us some flexibility that others wouldn't have because we don't have the whole world looking at us...we can start from a more principled position where certain political interests may not kick us and push us and shove us and shape us. We can really shape ourselves with the kind of ethics, the kind of process, and the kinds of developmental level that eventually humanity *will* be looking at. So, we have a responsibility right now, being in this space of planning for the illuminated future for developmentalism. It's a place where in the future, the whole of humanity will be looking at *that* and some other flower will be poking out of the sidewalk. What are they going to be looking at 10 years, 20 years, 50 years, 100 years down the road? What are we doing here today that they will be looking at then? That's my question.

Bill: Mmm, I'm sure glad we have every single voice here today as I listen to your voice. Thanks, folks. Let's stop, and then let's go. Thank you very much.

[general appreciative applause on part of all for all...]

Working Within the Limits: Thoughts on Stein and Heikkinen

Theo Dawson

As a woman on an assessment mission, I echo many of the concerns raised by Stein and Heikkinen. It is important for those of us who use assessments to ensure that they (1) measure what we say they measure, (2) measure it reliably enough to justify claimed distinctions between persons, and (3) are used responsibly. It is relatively easy for testing experts to create assessments that are adequately reliable for individual assessment, and although it is more difficult to show that these tests measure the construct of interest, there are reasonable methods for showing that an assessment meets this standard. However, it is more difficult to ensure that assessments are used responsibly.

Few consumers of tests are aware of their inherent limitations. Even the best tests, those that are highly reliable and measure what they are supposed to measure, provide only a limited amount of information. This is true of all measures. The more we hone in on a measureable dimension—the greater our precision becomes—the narrower the construct becomes. Time, weight, height, and distance are all extremely narrow constructs. This means that they provide a very specific piece of information extremely well. When we use a ruler, we can have great confidence in the measurement we make, down to very small lengths (depending on the ruler, of course). No one doubts the great advantages of this kind of precision. But we can't learn anything else about the measured object. Our measurement cannot tell us what the object is, how it is shaped, its color, its use, its weight, how it feels, or how attractive it is. We only know how long it is. To provide an accurate account of the thing that was measured, we need to know many more things about it, and we need to construct a narrative that brings these things together in a meaningful way.

A really good psychological measure is similar. The LAS, for example, is designed to go to the heart of development, stripping away everything that does not contribute to the pure developmental "height" of a given performance. Without knowledge of many other things—such as the ways of thinking that are generally associated with this "height" in a particular domain, the specific ideas that are associated with this particular performance, information from other performances on other measures, qualitative observations, and good clinical judgment—we cannot construct a terribly useful narrative.

And this brings me to my final point: Formal measures, no matter how many great ones we design, should always be employed by knowledgeable mentors, clinicians, teachers, or coaches as a single item of information about learners that may or may not provide useful insights into their needs. Consider this relatively simple example: a given 2-year-old may be tall for his age, but if he is somewhat under weight for his age, the latter measure may seem more important. However, if he has a broken arm, neither measure may loom large—at least until the bone is set. Once the arm is safely in a cast, all three pieces of information—weight, height, and broken



arm—may contribute to a clinical diagnosis that would have been difficult to make without any one of them.

It is my hope that the integral community will choose to adopt high standards for measurement, then put measurement in its place—alongside good clinical judgment, reflective life experience, qualitative observations, and honest feedback from trusted others.

Appendix: Reliability – Some Basics

There is a great deal of confusion in the assessment community about the interpretation of statistical reliability. This confusion results in part from the different ways in which researchers and test developers approach the issue. Researchers learn how to design research instruments, which they use to study population trends or compare groups. They evaluate the quality of their instruments with statistics. One of the statistics used is Cronbach's Alpha, an indicator of statistical reliability that ranges from 0 to 1. Researchers are taught that Alphas above .77 or so are acceptable for their instruments, because this level of reliability ensures that their instrument is measuring real differences between people.

Test developers use a special branch of statistics called psychometrics to build assessments. Assessments are designed to evaluate individuals. Like researchers, test developers are concerned about reliability, but for somewhat different reasons. From a psychometric point of view, it is not enough to know that an assessment measures real differences between people. Psychometricians need to be confident that the score awarded to an individual is a good estimate of that particular individual's true score. Because of this, psychometricians set higher standards for reliability than those set by researchers.

The table below will help to clarify why it is important for assessments to have higher reliabilities than research instruments. It shows the relationship between statistical reliability and the number of distinct levels (strata) a test can be said to have. For example, an assessment with a reliability of .80, has 3 strata, whereas an assessment with a reliability of .94 has 5.

Reliability	Strata
.70	2
.80	3
.90	4
.94	5
.96	7
.97	8
.98	9

Strata have direct implications for the confidence we can have in a specific person's score on a given assessment, because they tell us something about the range within which a person's true score would fall, given a particular score. Imagine that you have taken a test with a scoring range of 0 to 500 and a reliability of .94. The number of strata into which this assessment can be

divided is 5, which means that each strata equals about 100 points on the 500 point scale. If your score on this test is 350, your true score is likely to fall within the range of 300 to 400.¹

Statistical reliability is only one of the ways in which assessments should be evaluated. Test developers should also ask how well an assessment measures what it is intended to measure. And those who use an assessment should ask whether or not what it measures is relevant or important.

Resources

Guilford J. P. (1965). *Fundamental statistics in psychology and education*. 4th Ed. New York: McGraw-Hill.

Kubiszyn T., Borich G. (1993). *Educational testing and measurement*. New York: Harper Collins.

Wright B. D. (1996). Reliability and separation. *Rasch Measurement Transactions*, 9, 472.

Theo Dawson is the founder of *Developmental Testing Systems* and creator of the *Lectical Assessment System*. Her dissertation demonstrated the power and utility of a novel methodology that makes it possible to describe conceptual development in any domain of knowledge without the expense of conducting longitudinal research.

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¹ This range will be wider at the top and bottom of the scoring range and a bit narrower in the middle of the range.

A Personal Counterpoint to Stein and Heikkinen

Michael Basseches

I want to start my comments with my personal applause for the work of all of those colleagues who have put tremendous effort into improving the systematic measurement of developmental phenomena. The many ways in which this body of work is of value is beyond the scope of my brief comments here. Here, I want to address the context in which Stein and Heikkinen review this work.

In my book *Dialectical Thinking and Adult Development*, published in 1984, I attempted not only to describe the organization and identifiable possible indicators of dialectical thinking as a form of organization of thought. I also tried to justify the claim that dialectical thinking represented a more developed form of thought than both universalistic formal thought and relativistic thought. This effort at justification relied heavily on philosophical argument and examples that demonstrated that dialectical thought represented a higher level of cognitive equilibrium – more differentiated, integrated, stable and adaptive. I saw the description and the justification offered as the core of the book’s contribution. The cross-sectional data, reported from my doctoral dissertation, that a group of college faculty demonstrated more development of dialectical thinking than a group of college seniors, who in turn demonstrated more development of dialectical thinking than a group of first-year college students was consistent with the argument, but not in any way a substitute for the philosophical argument. Quite likely there are other measures that would demonstrate parallel findings differentiating college faculty from seniors and seniors from first-years, e.g. mean income, mean number of children, and mean weight. However, such findings should not and would not be taken as indicative of development.

While I don’t mean to suggest that this very simple example is at all comparable to the very sophisticated approaches to empirical validation of measures that Stein and Heikkinen discuss, I bring it up to introduce important ways in which my own assumptions agree with and differ from theirs. I agree with their view, as summarized by Murray and Reams, that “there is a persistent fact/value confusion in the field of developmental research and application, in which higher levels of development are assumed, implicitly or without sufficient justification, to be desired and of superior value.” Where I think I differ from them, is in regard to what kind of justification of “superior value” is appropriate.

At an epistemological level, when it comes to the concept of development, I don’t believe that any amount or form of empirical data can substitute for philosophical argument. Development, as I use the term in my book and as I think is consistent with the Piagetian genetic epistemology tradition, remains an essentially philosophical idea. While Piaget’s contribution was to offer observations of ontogenesis as a novel way of addressing existing epistemological questions, ontogenetic data were used in the service of philosophical argument and demonstration, rather than offered as a substitute.



Put simply, I would never want for any of my readers to adopt the view that dialectical thinking represented a more adequate form of cognitive organization, unless they could understand why and how it was more adequate. Nor would I accept as more adequate any proposed form of reasoning if I couldn't see why and how it was more adequate, no matter what the validity and reliability profiles of the measures were. I believe one can integrate empirical and philosophical justification, but neither can be reduced to nor be substituted for the other. If one is unable to appreciate the value of a supposedly more sophisticated structure of reasoning or action than one's own customary form, one should not accept its value until one has reached a point where one can understand its value.

With regard to dialectical thinking, my correspondence and interaction with the many who have showed particular interest in my work has indicated that in each case they have been attracted to dialectical thinking by some sense, (gathered perhaps in part from my own work and/or from their own intellectual adventures,) that there is something more complex and more epistemologically adequate about dialectical thinking. With regard to expectations about my own intellectual development, I expect, based on developmental theory, I would expect that I would begin the process of starting to appreciate a proposed "higher-level" structure only after I encountered the limits of my lower level structure, and began to glimpse the power of the novel alternative to transcend those limits. Further discovery, and a reorganization process would need to ensue before I mastered and fully grasped the value of the "higher-level" structure. This process is as it should be – totally appropriate.

From my perspective it would be a perversion of the developmental process if I rejected the adequacy of my own reasoning, simply because a developmental researcher—an authority figure—tested me using measures with quality-control approved stringent reliability and validity profiles and told me I had a low score. If a teacher expected me or others to do so, I would view him or her as a teacher intellectually disrespectful of his or her students—a kind of teacher who fails to promote real development. In my view we need fewer of such teachers, rather than a new cadre armed with such validated development measures to legitimize their authority. For clarification, I ask whether Stein and Heikkinen would view such teaching as ethical practice.

In considering such teachers, I begin to address the more pragmatic aspects of Stein and Heikkinen's argument, "If we want to see an integral and developmental worldview gain a real institutional foothold—radically reforming business, government, education, therapy, and our own sense of human potentials—we need to get serious about our quality control standards" (p. 19). Whether or not I want to see that happen would depend on *how* such a world-view might gain a foothold. Because I view as dangerous the idea that any kind of empirical validation of measures could substitute for the philosophical arguments on behalf of the value of developmental phenomena, the quote above raises for me the specter of people who neither understand nor are convinced by the arguments beginning to systematically evaluate other people, even choosing who to hire or who to promote in the workplace, based on standardized measures of developmental phenomena. I find this terrifying. It suggests a tyranny of measures that replaces respectful discourse and collective adaptation as the social context in which development does or doesn't occur. It suggests those with an integral and developmental world view becoming an elite that would use social institutions to ideologically and socio-politically dominate the "developmentally inferior."

I very much appreciate the work of Stein and Heikkinen and of the editors of Integral Review for encouraging discussion of this crucially important epistemological issue. Such discussion must be critical discussion, and it is critically important at a time when the measurement of adult development seems to be moving from the role of supporting conceptualizations of intellectual problems toward becoming a basis for the way people treat other people in the contexts to which Stein and Heikkinen allude. I also appreciate the invitation to participate.

Sincerely,
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Further Issues in Stage Metrics

Michael Lampton Commons

Stein and Heikkinen (2009) are mostly right in their characterization of the lack of metric properties of most stage theories. However, they leave out two very important facts. One is that the Model of Hierarchical Complexity (MHC) is a general theory and part of the normal Mathematical Theory of Measurement (Krantz, Luce, Suppes, & Tversky, 1971; Luce, & Tukey, 1964) applied to the phenomena of difficulty. This means that the nature of hierarchical complexity and its implications for measurement are not included in the Stein and Heikkinen account. Another is that the MHC is not limited to scoring applications, such as its Hierarchical Complexity Scoring System (HCSS; Commons, Rodriguez, Miller, Ross, LoCicero, et al., 2007) or Dawson's Lectical Assessment System (LAS; 2008). The MHC is also used to generate tasks for measurement of any entities' performances of tasks (humans, social organizations, animals, and machines) as well as for other applications (e.g., design of neural nets; see Commons & White, 2006/2009).

Without these facts included, Stein and Heikkinen and their readers miss the importance of the theory and its role in the LAS methods they discuss. As a mathematics-based, behavioral developmental theory of measurement, it is a content-free stage-and-transition step generator. As such, it is a paradigm that accounts for the existence of developmental behavioral patterns and, among other things, the stage theories that describe such patterns. These facts bear directly on—and strengthen—Stein and Heikkinen's arguments and should be considered in discussions of developmental metrics and their properties.

The Nature of Order of Hierarchical Complexity Scale and Transition Scale

The sequence of orders of hierarchical complexity are built out of a very simple definition.

One task is more hierarchically complex than another task if all of the following are true.

- a) It is defined in terms of two or more lower-order task actions. In mathematical terms, this is the same as a set being formed out of elements. This creates the hierarchy.

$A = \{a, b\}$ a, b are "lower" than A and compose set A

$A \neq \{A, \dots\}$ A set cannot contain itself. This means that higher order tasks cannot be reduced to lower order ones. For example, postformal task actions cannot be reduced to formal ones.

- b) It organizes lower order task actions. In mathematics' simplest terms, this is a relation on actions. The relations are order relations

$A = (a, b) = \{a, \{b\}\}$ an ordered pair

- c) This organization is non-arbitrary. This means that there is a match between the model-designated orders and the real world orders. This can be written as: Not P(a,b), not all permutations are allowed.



By induction, one can build the whole sequence of orders of hierarchical complexity using just this definition and the assumption that there are elements. As a theorem, we proved that there can be only one such sequence of orders, the scale of the order of hierarchical complexity being ordinal. They are just counts of the number of times that a higher order action has organized a next order lower order action. Note that Order 1 consists of simple actions that do not organize action. Ordinal scales have indeterminately sized gaps (Luce, May, 2006 personal communication). The following case illustrates this. Person 1 is taller than person 2, who is taller than person 3, placing them in the order 1, 2, 3 from tallest down. But the first person is 6 feet and 1 inch tall, the second person is 6 feet tall, and the third person is 5 feet tall. The gaps between person 1 and 2 are not equal to the gaps for person 2 and 3 yet their ordinal numbers are 1, 2 and 3. Another theorem shows that all stage theories are subsets of the MHC but the reverse is not true (Commons & Pekker, 2009). See Appendix 1 for how the MHC organizes the orders and stages.

The nature of the order of hierarchical complexity scale and the corresponding stage of performance scale are missing from Stein and Heikkinen's account. The orders are absolute, ordinal, and fractal. The orders have the same construction at each order per definition given above. There is no confusion between steps and orders. Not only are the orders in every domain and content the same, the steps are the same irrespective of order of complexity. The order scale and transition steps scale are both fractal as Ross (2008) points out. The transition steps have a more complex mathematical underpinning to them due to their fractal nature. As a consequence of the fractal nature of orders and transition steps, the next stage performance is always an attractor and not an ideal or teleological end.

The measure of hierarchical complexity of a task item, for example in an assessment application, is analytically represented by its Order of Hierarchical Complexity (OHC). The measure of stage of performance on a task item is empirically represented by the Rasch Scaled Score. The Model of Hierarchical Complexity can be used to generate a sequence of vignettes or problems varying in hierarchical complexity. Sequences are administered to participants. The data are Rasch (1960/1980) analyzed. Rasch performance scores on items are converted into Stage scores (See Appendix 2). Stage scores are regressed against the order of hierarchical complexity of each of the items from a sequence. People are not at a stage, their performances may be. We do find distributions of stage even within a single participant on different items of the same hierarchical complexity within a single task sequence. Items are at an order, item performances are at a stage, persons' performances on a set of items are inferred from the stage of the adjacent items in a Rasch analysis. A Rasch Analysis simultaneously minimizes participant and item error.

To contrast it with traditional stage theories, the MHC is not a psychological or mental view of stage. As one can see from the definition above, there is no mention of content, context, participants, gender, specific tasks, domains, type of organism or machine, or any other specific aspects. It does not depend on culture, or economic status. It is not only independent of particular language but language itself. Therefore, the MHC is not philosophical, teleological, or prescriptive. It is not masculine or feminine because it has no content. It is also not participant dependant or psychometric because it is an analytic mathematical theory of task properties and not person performance. The Hierarchical Complexity Scoring System (HCSS) and Dawson's

Lectical Assessment System also do not need committees of experts to figure out exemplars to define orders as did, for example, Kohlberg's early work or Loevinger's. It is not just a developmental theory but enables mapping of developmental theory onto it because it accounts for the underlying structure of such theory. It is also about more than development. It enables more critical thinking about what comprises development and also more rigorous empirical methods because it separates task (order of hierarchical complexity) from performance (stage).

Comparing Skill Theory and the Model of Hierarchical Complexity

The closest and most compatible stage theory is Fischer's Skill Theory (1980). There are many similarities and some differences. Both theories were conceived of separately but Fischer's (1980) was published first. Fischer (1981, personal communication) suggested the sentential order but does not include it himself. Fischer also suggested the name for the abstract order. Fischer does not recognize the paradigmatic and cross paradigmatic stages (see Appendix). The similarities include the following. The notion of mapping is probably translatable in the organizing of actions. The levels and orders are roughly the same. There are three differences. Skill theory has tiers, which MHC does not. The tiers seem to limit the existence of the paradigmatic and cross paradigmatic orders and make it hard to add the sentential order. Rasch analysis (Karabatsos, 2001) is also part of Mathematical Theory of Measurement. The mathematical basis of the MHC, and the implications thereof, is what most distinguishes it from Fischer's skill theory.

History of the Model of Hierarchical Complexity

The Model of Hierarchical Complexity has developed over four periods

1. General Stage Model (GSM) 1 (Commons, & Richards, 1984). 1978-1983. Did not entirely separate task properties and performance properties. Signal detection was used to measure performance. Axioms had serious problems.

2. General Stage Model (GSM) 1984-1998. (Commons, Trudeau, Stein, Richards, & Krause, 1998). Task and performance were separated. Essentially correct informal axioms and definitions introduced. The transition steps were introduced. A scoring manual was developed. At the beginning of the period 1997 to 2006, Dawson had suggest that the gap sizes might be equal. This turned out not to be true as Luce (May, 2006, personal communication) pointed out.

3. Model of Hierarchical Complexity 1997-2008. Dawson (Personal communication, 1997; 2002, 2003) introduced the name Model of Hierarchical Complexity and Rasch analysis for measurement. Commons and Pekker (2008; Commons, Goodheart, Pekker, Dawson, Draney, & Adams, 2008) mathematically formalized the definitions and axioms to more closely meet the Theory of Measurement standards. The ordinal nature of the orders was more clearly articulated along with the indeterminate nature of gaps when they exist. Ross (2008) introduced the fractal nature of orders, stages, and steps.

4. MHC in mathematical refinement stage. The last of the problems of meeting the mathematical criteria in the Theory of Measurement are being addressed. Ross is doing

further research on transition steps and seeking collaborators to investigate how the fractal nature of transitions can be mathematically represented. Precision teaching has been applied to the issue of scoring and item construction.

As one can see from the periods the MHC can have faults, which so far have been able to overcome. It is a testable theory: if there was an additional order discovered in between the orders now asserted, the theory would need revision (Falmange, 2009, personal communication)

Using the Model of Hierarchical Complexity

In mapping the mathematical orders of order of hierarchical complexity and of stage transition on to real world data, there are a number of considerations. Because the model does not call for global measures (e.g., of a person's "center of gravity"), it is possible to look at change trial by trial, choice by choice, task action by task action. Performance measures can be applied at any time scale to help uncover process.

The methodology is also flexible in contrast to instrument-dependent stage theories (e.g. Loevinger, 1976, 1978; Rest, 1979 Rest, Narvaez, Bebeau, & Thoma, 1999). One can give tasks that are open ended, close ended using choice or preference, or rating scales for example with vignettes. One can even give tasks that vary in Order of Hierarchical Complexity (OHC) to animals who do not talk and also to computers. The mapping is not sample dependent and is not psychometric but analytic at its base. Because the MHC is analytic it can be mathematically true but not useful. Hence it is true that it does not depend on data but it is extremely useful in seeing if applications performed as predicted. For example, the order of hierarchical complexity predicts the Rasch scaled stage score performances on the same items with r 's ranging from .85 to .99. By contrast, other stage theories have no such independent variable much less one that works as well as order of hierarchical complexity (see Dawson, 2006).

Because of the flexibility of the time scale for both assessing stage and transition step, it is possible to determine within person distributions of both stage (Fischer, Stein, & Heikkinen, 2009), and step (Ross, 2008). It is possible to get longitudinal data of those distributions. The steps also have their distribution both within a trial or across trials. Theoretically one can make problems that determine the steps at a given stage so that interviewing and scoring are not necessary. The model helps understand the non-stage aspects of development. By examining the residuals after its effects of the Order of Hierarchical Complexity (OHC) it possible to identify other dimensions of difficulty and development as measured by performances.

Conclusion

Stein and Heikkinen's (2009) restrictive view of the MHC, limiting it to the scoring of speech and writing, is apparently because their main exposure is to Dawson's application of it in the LAS. The restriction does not do justice to the scope and power of the model, which largely enables their discussion of validity, metrics, and measurement in developmental theory. One implication of the model providing the content-free, underlying structure of developmental stages is that other stage theories could be mapped into the orders of hierarchical complexity and thus benefit from the same kind of strength in validity and metrics as the LAS benefits from.

Then, rather than being merely inductive schemes that cluster behavioral characteristics, they could rest on—and draw from—hierarchical complexity’s strong theoretical and methodological bases, which currently they do not.

In addition to responding to Stein and Heikkinen’s article, this writing would be incomplete without mentioning some final methodological implications of the model. One can have a true comparative cognition and evolutionary behavioral developmental account of the increased power or reasoning, problem solving, emotion, etc. (see Commons, 2006). The determination of power is based on making actual comparisons across different animal species and machines. This in turn leads to the possibility of constructing stacked neural networks® (Commons, 2008; Commons & White, 2006/2009). Stacked neural networks are based on the recapitulation of evolution as shown by the increase in the number of neural network stacks, with potential to have actually intelligent computers and droids.

References

- Brogden H. E. (1977). The Rasch model, the law of comparative judgment, and additive conjoint measurement. *Psychometrika*, 42, 631-35.
- Commons, M. L. (2008). Stacked neural networks must emulate evolution by using hierarchical complexity. *World Futures: Journal of General Evolution*, 64(5-7), 444-451.
- Commons, M. L. (2006). Measuring an approximate g in animals and people. *Integral Review: A Transdisciplinary and Transcultural Journal for New Thought, Research, and Praxis*, 3, 82-99.
- Commons, M. L., Goodheart, E. A., Pekker A., Dawson, T. L., Draney, K., & Adams, K.M. (2008). Using Rasch scaled stage scores to validate orders of hierarchical complexity of Balance Beam task sequences. *Journal of Applied Measurement*, 9(2):182-199.
- Commons, M. L., & Pekker, A. (2009). *Hierarchical complexity and task difficulty*. Unpublished manuscript. Available at <http://dareassociation.org/papers.php>.
- Commons, M. L., & Pekker, A. (2008). Presenting the formal theory of hierarchical complexity. *World Futures: Journal of General Evolution* 64(5-7), 375-382.
- Commons, M. L., & Richards, F. A. (1984). Applying the general stage model. In M. Commons, F. A. Richards & C. Armon (Eds.), *Beyond formal operations* (pp. 147-157). New York: Praeger.
- Commons, M. L., & Richards, F. A. (2002). Organizing components into combinations: How stage transition works. *Journal of Adult Development*, 9(3), 159-177.
- Commons, M. L., Richards, F. A., & Kuhn, D. (1982). Systematic and metasytematic reasoning: A case for a level of reasoning beyond Piaget's formal operations. *Child Development*, 53, 1058-1069.
- Commons, M. L., Rodriguez, J. A., Miller, P. M., Ross, S. N., LoCicero, A., Goodheart, E. A., et al. (2007). *Applying the model of hierarchical complexity*. Unpublished scoring manual. Available from <http://dareassociation.org> and commons@tiac.net.
- Commons, M. L., Trudeau, E. J., Stein, S. A., Richards, F. A., & Krause, S. R. (1998). Hierarchical complexity of tasks shows the existence of developmental stages. *Developmental Review*, 18, 238-278.
- Commons, M. L., & White, M. S. (2006/2009). *Intelligent control with hierarchical stacked neural networks*. Us Patent Office, Patent number 7152051.

- Dawson, T.L. (2002). A comparison of three developmental stage scoring systems. *Journal of Applied Measurement*, 3(2), 146-189
- Dawson, T.L. (2003). A stage is a stage is a stage: A direct comparison of two scoring systems. *Journal of Genetic Psychology*, 164, 335-364.
- Dawson, T. (2006). The meaning and measurement of conceptual development in adulthood. In C. H. Hoare (Ed.), *Handbook of adult development and learning*, (pp. 433-454). Oxford: Oxford University Press.
- Dawson, T. L. (2008). *The Lectical™ Assessment System*. 1. Retrieved July, 2008, from <http://www.lectica.info>
- Dawson-Tunik, T. L., Commons, M. L., Wilson, M., & Fischer, K. W. (2005). The shape of development. *The International Journal of Cognitive Development*, 2, 163-196.
- Falmagne, J. Koppen, M., Villano, M., Doignon, J., & Johannesen, L. (1990). Introduction to knowledge spaces: How to build, test, and search them. *Psychological Review*, 97(2), 201-24.
- Fischer, G. (1968). *Psychologische testtheorie*. Bern: Huber,
- Fischer, K. (1980). A theory of cognitive development: The control and construction of hierarchies of skills. *Psychological Review*, 87(6), 477-531.
- Fischer, K. W. Stein, Z., & Heikkinen, K. (2009) Narrow assessments misrepresent development and misguide policy: Comment on Steinberg, Cauffman, Woolard, Graham, and Banich. *American Psychologist*. 64(7), 595-600.
- Karabatsos, G. (2001). The Rasch model, additive conjoint measurement, and new models of probabilistic measurement theory. *Journal of Applied Measurement*, 2, 389-423.
- Keats, J. A. (1967) Test theory. *Annual Review of Psychology*, 18. 217-238.
- Keats, J. A. (1971) *An introduction to quantitative psychology*. Sydney, Australia: John Wiley & Sons Australasia Pty. Ltd.,.
- Krantz, D.H.; Luce, R.D; Suppes, P. & Tversky, A. (1971). *Foundations of measurement, Vol. I: Additive and polynomial representations*. New York: Academic Press.
- Loevinger, J. (1976). *Ego development*. San Francisco: Jossey Bass.
- Loevinger, J. (1979). Construct validity of the sentence completion test of ego development. *Applied Psychological Measurement*, 3(3), 281-311.
- Luce, R.D. & Tukey, J.W. (1964). Simultaneous conjoint measurement: a new scale type of fundamental measurement. *Journal of Mathematical Psychology*, 1, 1-27.
- Perline, R, Wright, B. D., & Wainer, H. (1979). The Rasch Model as additive conjoint measurement. *Applied Psychological Measurement*, 3(2), 237-255.
- Rasch, G. (1960/1980). *Probabilistic models for some intelligence and attainment tests*. (Copenhagen, Danish Institute for Educational Research), expanded edition 1980. Chicago: The University of Chicago Press.
- Rest, James (1979). *Development in Judging Moral Issues*. University of Minnesota Press. . "Center for the Study of Ethical Development" (Website). DIT-2. <http://www.centerforthestudyofethicaldevelopment.net/DIT2.htm>. Retrieved 2006-12-04.
- Rest, J., Narvaez, D., Bebeau, M. & Thoma, S. (1999). DIT-2: Devising and testing a new instrument of moral judgment. *Journal of Educational Psychology* 91(4), 644-659 .
- Ross, S. N. (2008) Fractal transition steps to fractal stages: The dynamics of evolution, II. *World Futures*, 64(5-7), 361-374.
- Stein, Z., & Heikkinen, K. (2009). Models, metrics, and measurement in developmental psychology. *Integral Review*, 5(1), 4-24.

Tversky, A. (1967). A general theory of polynomial conjoint measurement. *Journal of Mathematical Psychology*, 14. 144-185.

Young, F. W. (1972). A model for polynomial conjoint analysis algorithms. In R. B. Shepard, A. K. Romney, & S. B. Nerlove (Eds.), *Multidimensional scaling. Theory and applications in the behavioral sciences*. New York: Seminar Press.

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Appendix 1

Orders of Hierarchical Complexity and Structures of Tasks

Order Ordinal and Name	General descriptions of tasks performed
0 Calculatory	Exact without generalization. Example: simple machine arithmetic on 0s, 1s
1 Sensory or motor	Discriminate in a rote fashion, stimuli generalization, move; move limbs, lips, eyes, head; view objects and movement. Discriminative and conditioned stimuli. Example: Either see circles, squares, etc., or instead, touch them. □
2 Circular sensory-motor	Form open-ended classes; reach, touch, grab, shake objects, babble; Open ended classes, phonemes. Example: Reach and grasp a circle or square. □
3 Sensory -motor	Form concepts; respond to stimuli in a class successfully. Morphemes, concepts. Example: A class of open squares may be formed □ □ □ □ □
4 Nominal	Find relations among concepts. Use names and use them and other words as successful commands. Single words may be ejaculatory and exclamatory, and include verbs, nouns, numbers= names, letters= names. Example: That class may be named, ASquares.@
5 Sentential	Imitate and acquire sequences; follow short sequential acts; generalize match-dependent task actions; chain words together. Use pronouns. Example: The numbers, 1, 2, 3, 4, 5 may be said in order.
6 Pre-operational	Make simple deductions; follow lists of sequential acts; tell stories. Count random events and objects; combine numbers and simple propositions. Use connectives: as, when, then, why, before; products of simple operations. Example: The objects in a row of 5 may be counted; last count called 5, five, cinco, etc. * * * * * □ □ □ □ □ ○ ○ ○ ○ ○ □ / " } Q
7 Primary	Simple logical deduction and empirical rules involving time sequence. Simple arithmetic. Can add, subtract, multiply, divide, count, prove, do series of tasks on own. Times, places, counts acts, actors, arithmetic outcome from calculation. Example: There are behaviors that act on such classes that we call simple arithmetic operations. $1 + 3 = 4$; $5 + 15 = 20$; $5(4) = 20$; $5(3) = 15$

8 Concrete	Carry out full arithmetic, form cliques, plan deals. Do long division, follow complex social rules, take and coordinate perspective of other and self. Use variables of interrelations, social events, what happened among others, reasonable deals. Example: There are behaviors that order the simple arithmetic behaviors when multiplying a sum by a number. Such distributive behaviors require the simple arithmetic behavior as a prerequisite, not just a precursor. $5(1 + 3) = 5(1) + 5(3) = 5 + 15 = 20$
9 Abstract	Discriminate variables such as stereotypes; use logical quantification; form variables out of finite classes based on an abstract feature. Make and quantify propositions; use variable time, place, act, actor, state, type; uses quantifiers (all, none, some); make categorical assertions (e.g., AWe all die.@). Example: All the forms of five in the five rows in the example are equivalent in value, $x = 5$.
10 Formal	Argue using empirical or logical evidence; logic is linear, one-dimensional; use Boolean logic=s connectives (not, and, or, if, if and only if); solve problems with one unknown using algebra, logic, and empiricism; form relationships out of variables; use terms such as if...then, thus, therefore, because; favor correct scientific solutions. Example: The general left hand distributive relation is $x * (y + z) = (x * y) + (x * z)$
11 Systematic	Construct multivariate systems and matrices, coordinate more than one variable as input; situate events and ideas in a larger context, i.e., considers relationships in contexts; form or conceive systems out of formal relations: legal, societal, corporate, economic, national. Example: The right hand distribution law is not true for numbers but is true for proportions and sets. $x + (y * z) = (x * y) + (x * z)$; $x \cup (y \cap z) = (x \cap y) \cup (x \cap z)$ <i>Symbols:</i> \cup = union (total elements); \cap = intersection (elements in common)
12 Meta-systematic	Integrate systems to construct metasystems out of disparate systems; compare systems and perspectives in a systematic way (across multiple domains); reflect on and name properties of systems. Example: The system of propositional logic and elementary set theory are isomorphic. $x \& (y \text{ or } z) = (x \& y) \text{ or } (x \& z)$ Logic; $x \cap (y \cup z) = (x \cap y) \cup (x \cap z)$ Sets T(False) \Leftrightarrow \emptyset Empty set; T(True) \Leftrightarrow Ω Universal set <i>Symbols:</i> $\&$ = and; \Leftrightarrow = is equivalent to; T = Transformation of
13 Paradigmatic	Integrate or discriminate how to fit metasystems together to form new paradigms. Includes ability to show that there are no ways to fit together any set of metasystems. $\Omega_1 \circ \Omega_2 = \Psi^a$ <i>Symbols:</i> Ω_n = e.g., Algebraic Metasystems; Ω_n = e.g., Geometric Metasystems; Ψ^a = Analytic Geometry as a paradigm
14 Cross-paradigmatic	Integrate, compare, reflect on and name properties of paradigms within or across domains. Fit paradigms together to form new fields.

Note: From “Applying the Model of Hierarchical Complexity” (p. 65), by Commons, Rodriguez, Miller, Ross, LoCicero, Goodheart, & Danaher-Gilpin. 2007. Cambridge, MA: Dare Association, Inc. Copyright 1991-2007 by Dare Association, Inc. Adapted and reprinted with permission.

Appendix 2

Because of the discussion of metrics in Stein and Heikkinen (2009), it is important to point out the difference in formal measurement theory terms between the orders of hierarchical complexity, which is an ordinal scale analytic measure, and the corresponding measure of performance Rasch scaled item and person scores which is conjoint. As Perline, Wright, and Wainer, (1979) state, “the Rasch (1960) model is a practical realization of conjoint measurement (Brogden, 1977; Fischer, 1968; Keats, 1967, 1971). Tversky (1967) discussed the Bradley-Terry-Luce choice model, which is closely related to the Rasch model, in terms of conjoint measurement. Young (1972) also considered the Bradley-Terry-Luce model in these terms and remarked generally that “the scaling methods in psychometrics conform to the notion of polynomial conjoint measurement.”

One would like to have a person stage of performance score. But there is no simple and direct way of obtaining that score from a Rasch analysis. A Rasch scaling procedure minimizes errors of fit to both persons (participants) and items at the same time. The Rasch map displays the person performance scaled values on the left side of a linear vertical scale and the items scores on the right side of that same scale. But the problem is that Rasch scores are not in the stage metric. And, to make things more curious, the order of hierarchical complexity is ordinal and cannot be averaged, summed, or even subtracted. But the Rasch scores can. Hence the interpolation between adjacent orders of hierarchical complexity of items is based on the Rasch scale for which interpolation is fine. This is because the Rasch scale is a conjoint measure which allow for summing.

To find the person performance stage from the adjacent corresponding items’ order of hierarchical complexity, one can interpolate between the items’ hierarchical complexity. There is no assumptions about the size and nature of a possible gap. The Rasch scale is linear between OHC because Rasch is a conjoint measure. This can be done by translating the Rasch scores into stage of performance scores based on the corresponding absolute values of the order of hierarchical complexity of the items. They represent the stage of a person’s performance according to the Model of Hierarchical Complexity. A person’s stage of performance score is calculated by using the equation:

$$\text{Stage of Person} = \frac{\text{Person Rasch Score} - \text{Stage Mean}_1}{\text{Stage Mean}_2 - \text{Stage Mean}_1} + \text{Item HC}$$

Stage of Person = Stage of performance of person in Order of Hierarchical Complexity number.

Person Rasch Score = The Rasch Scaled performance score for a person.

Stage Mean = Mean Rasch Score for items of a given hierarchical complexity.

Item HC = Items order of hierarchical complexity.

This relationship between the two scales allows for using local interpolating between items with adjacent orders and not overall. After this transformation the obtained stage of performance scores for persons can be compared. This is useful in doing a factor analysis.

A Practitioners' Perspective on Developmental Models, Metrics and Community

Chad Stewart, Zach Smith and Norio Suzuki

Abstract: This article builds on a paper by Stein and Heikkinen (2009), and suggests ways to expand and improve our measurement of the quality of the developmental models, metrics and instruments and the results we get in collaborating with clients. We suggest that this dialogue needs to be about more than stage development measured by (even calibrated) stage development-focused, linguistic-based, developmental psychology metrics that produce lead indicators and are shown to be reliable and valid by psychometric qualities alone. The article first provides a brief overview of our background and biases, and an applied version of Ken Wilber's Integral Operating System that has provided increased development, client satisfaction, and contribution to our communities measured by verifiable, tangible results (as well as intangible results such as increased ability to cope with complex surroundings, reduced stress and growth in developmental stages to better fit to the environment in which our clients were engaged at that time). It then addresses four key points raised by Stein and Heikkinen (need for quality control, defining and deciding on appropriate metrics, building a system to evaluate models and metrics, and clarifying and increasing the reliability and validity of the models and metrics we use) by providing initial concrete steps to:

- Adopt a systemic value-chain approach
- Measure results in addition to language
- Build on the evaluation system for instruments, models and metrics suggested by Stein & Heikkinen
- Clarify and improve the reliability and validity of the instruments, models and metrics we use

We complete the article with an echoing call for the community of Applied Developmental Theory suggested by Ross (2008) and Stein and Heikkinen, a brief description of that community (from our perspective), and a table that builds on Table 2 proposed by Stein and Heikkinen.

Purpose of this Article

We appreciate the outreach by Tom Murray and Jonathan Reams to invite us into the “community of engagement” (not yet a “community of practice”) around building a network (and eventually Institute?) for Applied Developmental Theory—as well as Ross (2008) for the original call for the Institute, and Stein and Heikkinen (2009) for picking up the call.

Our purpose in writing this article includes three objectives:

1. Propose a concrete (meaning it has been used and refined with several groups of end-user clients as well as integral practitioners) and granular (meaning it includes multiple levels of technologies that allow users to “drill down” into increasingly narrow and precise applications) application of Ken Wilber's Integral Operating



System (IOS) for our dialogue around the innovation and application of developmental models and metrics because a quality control focus and concentration on linguistic-based metrics are necessary, but by no means sufficient.

2. Contribute to the creation and increased coherence of a collaborative community that improves the functionality and ethical application of developmental models with individuals, organizations and societies.
3. Attempt to contribute to the dialogue in ways that “integrate first, second, and third person perspectives, and illustrate an author's embodiment of higher (second tier, integral, meta-systematic, etc.) levels of ethical and psycho-socio-systemic reflection” from a perspective of “authenticity/vulnerability/empathy and rigor at levels rarely seen in academic discourse” (Murray & Reams, invitation letter to this dialogue).

Objective #1 is addressed in the content of the article, while Objective #2 is the context we are building through our dialogue about creating a coherent community of practice around improving the functionality and ethical application of developmental models and metrics, and Objective #3 is the process of how we engage in this dialogue.

Background and Bias

As part of our attempt to embody Objective #3, we shall begin with a brief overview of our background and bias. Our work in building communities within organizations and within communities among organizational leaders has led us to a deep respect for the need to manage the dilemmas raised by respecting and integrating multiple perspectives, abstract models and concrete metrics and tools. Having spent over ten years working as change agents within and for large corporations, government organizations and NPOs biases us towards “what is possible right now, with these people to whom we have a fiduciary responsibility, in this context” while also attempting to move with these people towards a more ideal position over time. Furthermore, we are biased by our experience and results with our colleagues and clients in:

- Talent development (executive team development, succession planning, leadership competency development),
- Organization development (M&A integration, cultural integration, systems & processes improvement, performance improvement),
- Change management (cultural transformation from one structure, state, system and/or stage of development to one more fitting to its environment based on demands on the organization from its value-chain and market), and
- Social entrepreneurship in building and running our own organizations (Abound, Integral Japan, Interkonnections) in Japan and the US.

These experiences and results bias us toward:

- Weaving together practical application and emergent design in the field (the use, adaptation and creation of technologies that work at that point in time and in that specific context with those specific people) with research and theory-building in the

think-tank (building and refining models and metrics that serve as general guidelines for fieldwork and are improved by what emerges from the field) over taking either stance alone.

- A “fit-to-role” perspective that we should be looking at “multi-dimensional degree of fit” as a set of metrics over a single “higher is better” metric.
- The need to simultaneously and cohesively evolve both individuals and the system and community that houses those individuals to be more “fit-to-role” over either an “individual focus” or “organizational focus” (our experience indicates that without cohesive transformation, the effect is diluted and reversion to previous patterns is likely).
- “Dilemma management” (individual & collective plus current & target poles) and legal (e.g. “personal information” law in Japan) approach to the ethical question of how much “developmental” information a person or team should share internally (and in what form and to what degree this information should be accessible by HR, a person’s managers, and top management) over a “coach-client privilege” approach. Usually we have created “leadership profiles” that are available to the leader’s manager, manager’s manager, CHRO, and program sponsor—CEO or Senior VP. Often the members have chosen to share their developmental information with their team.
- “Results orientation” that measures and improves both “lead indicators” (predictors of performance such as developmental stage and level of competencies directly related to the task at hand for individuals and cultural stage and degree to which systems and processes are able to deal with the task at hand for organizations) and “lag indicators” (“qual-and-quant” measurements of actual results such as level of trust by team members and project costs reduced for individuals and social reputation, brand image, increased profitability and return-on-investment, increased number of people fed, educated and pollution mitigated for organizations). Most integral-related developmental models and instruments that we have seen to date are focused exclusively on “lead” indicators and therefore deprive both suppliers and customers of these models and instruments of the ability to truly test half of the benefit to the individual or organization. Notably, most of the clients we have worked with have at one point or another expressed some variation of “honestly, I just want the results.”
- Requirement of fieldwork and client-needs to adjust or transform models, metrics and instruments to reflect changes in clients, context and the market environment over keeping these tools static

In short, we see ourselves as world-class developmental practitioners and guidance professionals, but not world-class organization and community leaders or academics. Therefore, we are strongly interested in collaborating with world-class organization and community leaders and academics to work through (among other issues) the complexity raised by the points above.

Given the current approaches to working with developmental models and metrics, we also strongly feel the need for a more concrete granular integral framework for addressing development. Before briefly presenting one such framework and its applicability to our community and identifying and resolving the core issues we face, we will take a first look at some of the models and instruments capable of assessing development at individual and collective levels.

Developmental Models and Instruments

For the reasons stated above, we propose that our community address developmental models and instruments designed to measure “lead” and “lag” indicators of performance at individual, team, organizational and larger society (e.g. city or national) levels of scope. We also propose that our community clearly indicate:

1. Which models and instruments are most relevant and qualified to measure lead and lag metrics (indicators) for which purposes—and why.
2. Which models and instruments are least (or not) relevant and qualified to measure lead and lag indicators for which purposes—and why.

Here, we provide a partial list of developmental models and instruments by level of scope. After discussing the framework and related issues involved in using and adapting the models and instruments in the next section, we conclude with a “work in progress” chart at the end of the article which builds on the chart presented by Stein and Heikkinen (2009) and provides our current perspective of which models and instruments are more and less relevant and qualified for which purposes and why. We look forward to continuing to refine this chart with the community.

Table 1. Partial List of Models and Instruments by Scope

Model	Instrument(s)	Scope	Supplier
Abundance / Sustainability	Organizational Sustainability Scorecard	Team Organization	Interkonnections
	City & Community Sustainability Scorecard	City/Community Region	
Cultural Transformation Tools	Individual Values Assessment	Individual	Values Centre
	Leadership Values Assessment	Individual	
	Small Group Assessment	Team	
	Cultural Values Assessment	Organization (Nation)	
Developmental Model of Intercultural Sensitivity (DMIS)—by M. Bennett	Intercultural Developmental Inventory (IDI)	Individual	Hammer & Associates
Constructive Developmental Framework	Developmental Assessment (Cognitive + Emotional/Social + Needs)	Individual	Interdevelopmental Institute
Ego Development	SCTi/MAP	Individual	Cook-Greuter & Associates

Leadership Capacity	360 CAP	Individual	Interkonnections
	Leadership Interview	Individual	
	Leadership Questionnaire	Individual	
	Leader Profile	Individual	
	Team 360 CAP	Team	
Leadership Development Framework	Leadership Development Profile	Individual	Harthill UK
Lectical Assessment System	LERA, LLRA, LDMA, LRJA, LSUA, LIMA, LMLA, LMSA	Individual	Developmental Testing Service
Requisite Organization (including Complexity of Mental Processing—CMP)	Requisite Organization Platform by ROII. No instruments found by GO Society.	Organization (Jacques' original work could also be used with Individuals)	Jacques (theory now available through Global Organization Design Society, RO Internatl. Institute)
Spiral Dynamics	Values Test	Individual	Spiral Dynamics Group
	Change State Indicator	Individual	
	CultureSCAN--Personal	Individual	
	ManagerSCAN 360	Individual	
	BusinessSCAN, SchoolSCAN	Organization	
	CommunitySCAN	Community	
	CultureSCAN	Team, Organization, Community, Nation	
Subject-Object Theory	Subject-Object Interview	Individual	Kegan, Lahey & associates

Given the sheer number of instruments available, especially individual-focused instruments, it initially appears that competition is inevitable. To some degree this may be the case, but an integral analysis of the instruments (see below) will show that most of the instruments are only practically useful for specific purposes and/or in specific circumstances—and that many of these conditions do not overlap. Using the instruments too far outside of these specific conditions fails to serve the client, and holds the possibility of damaging the reputation of the “developmental model and assessment” market. As self-proclaimed leaders of this community, it is in the best interest of ourselves, our clients and our colleagues to clarify which models and instruments are effective (and ineffective) in which conditions. The framework outlined below will help us in assessing the efficacy of the models and instruments in various conditions.

Concrete Granular “5C” Framework

We propose that one of our collective purposes in this dialogue and community-building initiative is to take a practical “concretized” integral approach to the metrics, measurement and application of developmental models in order to add perceived and actual value to our clients (e.g. change leaders, organizational leaders, HR professionals, and the communities within which

they operate), our colleagues and ourselves. For this to occur, it is necessary and (as a concrete next step) sufficient for us to include and integrate the rigor of traditional means of judging models and metrics (e.g. “validity” and “reliability”) while also transcending them by placing them within a fully integral framework. Based on our collective experience as change agents we believe such an applied framework needs to include all five of the minimal integral requirements proposed by Wilber’s Integral Operating System (1995, 2000, 2006), namely quadrants, stages/levels, styles/types, streams/lines, states/consciousness in a way that can be easily applied and adapted by various constituencies (on a wide scale). Without this scalability, we will be less able to attract clients who will actually purchase, use and measure the results of products (instruments) and services based on these models, as well as interesting colleagues to collaborate on improving the instruments and related services.

Since we have spent the last 10 years evolving and refining a framework with US, European and Japanese-based corporations, government organizations and NPOs (after originally working with the 4Q and Spiral Dynamics and other organization development tools in these organizations), we are proposing the use of this applied framework (“5Cs”) as a starting point for this community. (We originally called it “5S” for spheres/quadrants, stages, styles, streams and states, but clients kept saying “McKinsey has a 7S framework”).

These interwoven “5Cs” are:

1. Context Interface
2. Core Capacity
3. Character
4. Competencies
5. Consciousness

It is also crucial to implement these 5Cs in a cohesive way.

We shall briefly cover each of the 5Cs and their cohesion, and then use the 5Cs to address some of the issues raised by Stein and Heikkinen (2009) as well as new issues that come to light in using the 5Cs to address the innovation and application of developmental models and metrics. Since readers of the IR are “integral savvy,” we shall assume competence in the integral operating system (IOS), and build our brief overview of the 5C on top of this assumed shared understanding.

Context Interface

Context Interface begins with the integration of a slightly modified version of Ken Wilber’s “4 Quadrants” or “4Q” (it has simply been turned counter-clockwise 90°) with the “Iceberg Model” from intercultural studies. The lower half of the diagram is the invisible (“below the waterline”) dimension of individuals and groups that cannot be seen, such as values, beliefs and emotions, perceptions, mindsets and assumptions of individuals; and the culture, climate, collective consciousness, norms and shared assumptions of groups. The upper half of the diagram shows the visible (“above the waterline”) behavior of individuals (their actions and reflection) and groups (their structures, systems, processes and dynamics) and the results they

generate. Without conscious practice, the number, relationship and complexity of these factors in each situation makes the situation difficult for us to grasp, and easy to misunderstand. By mapping and adjusting to the influence and relationships of these various elements, we are able to better understand, act and reflect on the intersection of our external environment and behavior, our internal drivers and filters, and the results we co-create.

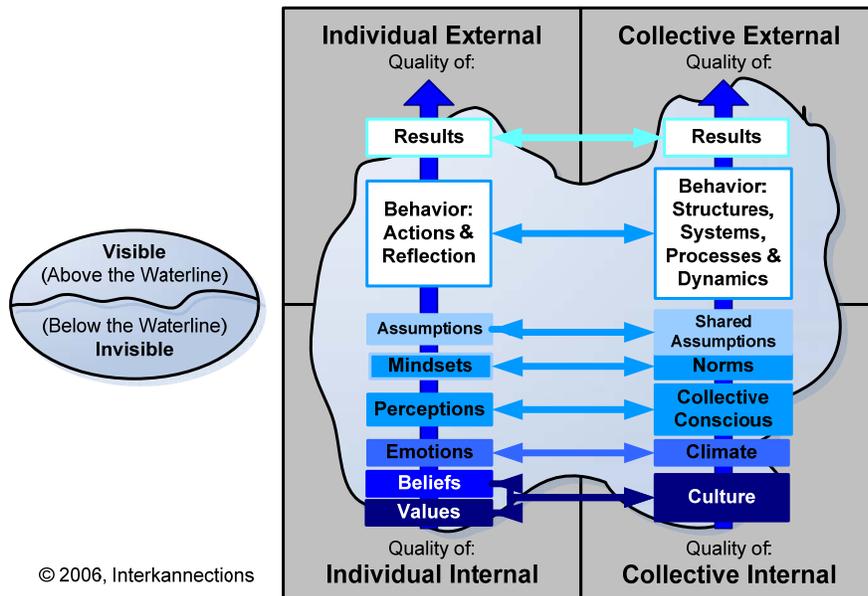
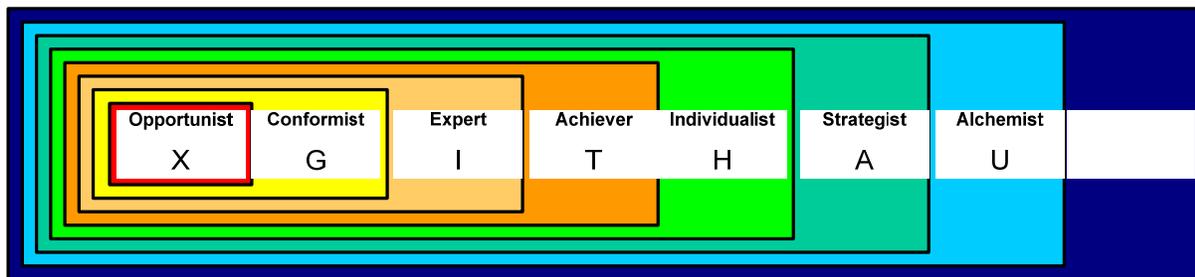


Figure 1: Context Interface (Integration of Wilber “4Q” with the Iceberg Model).
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Many granular technologies build from this first Context Interface diagram, but for the purposes of this article, the Iceberg 4Q will suffice.

Core Capacity

Our Core Capacity is the baseline from which we perceive, understand and act in the world on a relatively stable basis. The internal dimension of capacity is often called “stages” or “lines” in the developmental literature. In an initial burst of research, we cross-referenced developmental stage models created and used by 19 teams of developmental researchers and practitioners and found a high degree of correlation on both the internal stages (structures) and contents between these teams (charts that show the correlation is available on the Interkonnektions website). The research identifies distinct stages in human development based on cognitive, emotional, ethical, needs, social, and values models (and often metrics) and the ego that unifies them. We have integrated this knowledge with the latest research in leadership and global management competencies to create our Leadership Capacity model (“X” to “O”), shown below correlated to each of Dr. Susann Cook-Greuter’s stages of Ego Development (2002, 2004). We will not go into the levels (“X” to “O”) here, but interested parties can find these in the “Leading Evolutionary Change” whitepaper on the Resources page of the Interkonnektions website. The color scheme is similar to that suggested by Wilber (2006), but has been customized to use Spiral Dynamics (except for “Expert” / “I”) and other color schemes according to the needs of the context of application.



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Figure 2: Leadership Capacity Stages Correlated with Stages of Ego Development.
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Character

As people and professionals, the character of each of us is both unique and is strongly influenced by a variety of “styles” that have emerged within ourselves and the cultural environments in which we were raised and shaped. The “style” influences that our clients have found most useful and influential to work with (and therefore the base which we can add to as a community) include:

- Personality style (e.g., Enneagram, DiSC, Myers-Briggs)
- Organizational hierarchy and functional (R&D, Production, Sales, HRD, flat, distributed networks, etc.) styles
- Organizational cultural style (Gareth Morgan’s organizational styles, stages of organizational culture development ala Barrett and Adizes)
- National/ethnic cultural style (polarity management & dimensions of culture, Enneagram, stages of cultural development)
- Gender style (masculine and feminine, yin-yang)
- Family pattern style (discussion-based, authoritarian, no model or theory)
- Educational environment style (discussion-based, context based, experiential, drilling, no model or theory)
- Religious and/or philosophical style (mono-theistic & poly-theistic, internal & external locus of responsibility and control)

Competencies

Competencies are the specific skills that allow us to engage in a specific activity or practice (e.g., being a parent, running an organization, leading a project or division, building a community, playing tennis, playing the piano, mixed martial arts, writing a book, painting a picture, singing, applying and improving developmental models, etc.) and achieve a certain level of results.

To use a metaphor that is meaningful to most of our clients, Core Capacity is the “size of the container” that we have to perceive, understand and act in the world and Competencies are what goes into that container. Both of these must be matched to the context. If the context requires a

project leader, then the Capacity of “T” (Achiever/Orange) may be most appropriate because this is the stage at which project management and integration can really begin to be leveraged. Competencies should also reflect the needs of project leadership (e.g., time management, schedule management, budget control, communication, risk management, etc.).

Even a world-class MBA professor or leadership researcher who has a Core Capacity of “A” (Strategist/Yellow or Teal) would be unlikely to successfully lead a project or organization (and may cause considerable damage) if they have not successfully led teams or organizations before and have not been trained in the Competencies of project management or running an organization. Conversely, project leaders approaching project management at an “I” (Expert/between Blue or Amber and Orange) center of gravity can severely slow or damage the project due to a tendency to focus more on the parts than the whole.

In working with change leaders, change projects and organizations, we have found it useful to focus on both the specific Competencies required by a person for a project or situation in a specific context as well as the Categories (groups) of Competencies that are required for specific kinds or levels of change projects and/or organizational leadership.

Consciousness

In the 5C framework, Consciousness (our “state” of being) is the way in which we perceive, understand and act in the world moment to moment. The quality of our Consciousness affects the quality of our experience, results and affect on and with other people and our environment/context. Our quality of Consciousness in any given moment is affected by our health and balance within and between several spheres of Consciousness. For our work, we focus on four interconnected spheres of Consciousness:

1. **Body (Physiological):** This is the awareness of movement of energy in the body, how we breathe, how we sleep and dream, how we align ourselves and our posture, how we are affected by what we eat and drink, the quality and amount of exercise we get, our body temperature, and other physical conditions.
2. **Emotions (Affective):** This is how well we assess and manage the feelings, sensations and moods that arise within us such as joy, anger, sadness, boredom, frustration and hope—how we respond to them and, sometimes, how we feel pulled from one pole to another in short periods of time.
3. **Mind (Cognitive):** This is how we process information, what we commit to, how we organize meaning and information to exchange it and communicate with others, and our ability to predict and change the consequences of our actions.
4. **Connection (Social & Spiritual):** This is our felt sense of connection to that which we sense is beyond us, both in terms of a wider group of people and a deeper way of being. It includes faith, our mission/purpose, development and application of values, sense of potential, and the level of resonance, trust and conflict we have with others.

“5C” Coherence

Each of the “5Cs” brings an important perspective and set of questions to the application and improvement of developmental models and metrics. As integral practitioners and theorists, we know that insufficiently addressing any one of the “5Cs” (by whatever name and level of granularity) can leave a critical gap in awareness, assessment, individual action and aligned action that can create problems in supporting the development of individuals, organizations and cities and communities. As powerful as each of the “5Cs” is by itself, however, their true transformational power lies in understanding and engaging the connections and interplay between the “Cs” and bringing them into coherence as they relate to each specific undertaking, environment, and the people involved—and then taking that learning back into the refinement of the evolving model and metrics in a virtuous cycle of development. The way that we judge the effectiveness of our 5C Coherence is to measure the specific results that accrue in a six-level model of “stages of sustainability.” We will not provide an overview of the Stages of Sustainability here, but interested parties can find these in the “So, How Sustainable Are We?” whitepaper on the Resources page of the Interconnections website. The model actually has 10 stages (including the “levels of un-sustainability”) and is still a work in progress, but has been tested with corporate, government and NPO clients and allows us a reasonably accurate method (from the perspective of ourselves and our clients) of judging the developmental results of a person or organization’s actions because it focuses on real-world results (external, verifiable phenomena). It therefore allows us an external cross-check (using both lead and lag indicators) to the results of most developmental models which are primarily (often highly accurate) assumptions of internal development (and provide mostly lead indicators only). In the end, we cannot prove that someone is operating at an “A”/Strategist/Yellow or Teal “center-of-gravity,” but we can prove that the organization they are leading is producing triple-bottom-line value to their employees, customers and community (e.g. Burgerville’s full health care coverage for even part-time employees, bio-degradable utensils, all power purchased from wind-energy credits, financial contribution to education, financial out-performance of industry competitors in same location).

Using the 5Cs and their Coherence, we shall now turn to “our current top 4” issues that we suggest our community address related to the use and improvement of developmental models and metrics.

“Current Top 4” Issues of Developmental Models and Metrics

In our developmental guidance work with clients, we have found that an effective place to begin is to work together in defining the scope and framework of our initiative, discovering the core issues, and crafting initial solutions. We appreciate the issues proposed by Stein and Heikkinen (2009), including:

1. The need for quality control.
2. Defining and deciding on appropriate metrics, and
3. Building a system to evaluate models and metrics.

4. Clarifying and increasing the reliability (are the instruments and metrics accurate) and validity (do the instruments and metrics measure what they claim to measure) of models and metrics.

We suggest expanding the frame of these four issues as described below. We also suggest distinguishing “metrics” from “instruments” since some instruments provide one metric (e.g. MAP) and others provide multiple (e.g. organizational sustainability scorecard). Stein and Heikkinen initiate a dialogue on several other issues, but here we will respond to/build on those above because we perceive them as “core issues” (root causes) rather than “presenting problems” (surface level issues that stem from core issues) for our community. We look forward to working with members of this community on uncovering these and other core issues and collaborating on cohesive solutions to resolve them. In the spirit of this exploration, here are our “current top 4:”

1. Adopt a Systemic Value-Chain Approach: We suggest expanding our community's discussion from the current QC focus (Stein & Heikkinen, 2009) to include additional “nodes” of the value-chain. Usually, this includes internal value-chain nodes (strategy, HR, operations, IT, R&D, production, quality control, sales & marketing, service/delivery, customer service, etc.), external value-chain nodes (supply chain entities, customers, end-users, competitors, strategic partners, etc.) and SPECTREM entities and factors: Social, Political/Governmental, Economic, Cultural, Technological, Religious, Ecological and Military. For our purposes, however, an effective next step would be to look at eight nodes:

1. Strategic Partnerships/Community-building (how do we gather our “best in class” members of the Applied Developmental Theory community and collaborate while also building our mutual bottom-lines—rather than simply competing as small niche players in the leadership development, OD, change management and similar markets?)
2. Strategy (what are we intending to do with the models and instruments and how will we do this—5C analysis?)
3. Clients & Customers (which current and potential customers “fit” our strategy from a “5C” perspective?)
4. R&D (what tools do we have now, how can they be improved, and what new tools do we need to develop?)
5. HR—including Production & Service/Delivery (who do we have that can develop, improve and implement those tools and how do we develop these people to meet these demands?)
6. QC (how do we set and maintain quality control standards in the community?)
7. Sales & Marketing (how do we increase our work with our current and target customers?)
8. Customer Service (how do we ensure that we are meeting our customers' needs and receive useful feedback that improves strategy, R&D, HR and QC?)

Naturally, we are suggesting that we gather people together who can add 5C value to our community. We propose that members should be able to provide high-quality input and performance (competencies) to one or more nodes (functional character) that illuminates the value-chain (context interface) in a way that is mutually respectful, supportive and collaborative (consciousness) while operating at a high level of perception, understanding and action

(capacity) and individually and collectively delivering cohesive results (cohesion/sustainability stages).

2. Measure Results in Addition to Language: Stein and Heikkinen (2009) state that

building a metric entails moving from ... everyday interpretation of language towards more systematic modes of differentiating between different types of linguistic performances. Importantly, with the exception of a few experimental paradigms (e.g., Piagetian balance beam tasks) all developmental metrics entail the interpretation of linguistic performances. This point is often overlooked. (p. 10)

As far as we know, the “experimental” part is correct. We also started out using solely linguistic-based instruments that used soft or calibrated metrics to measure lead indicators such as personal “action logics” and cultural stages. However, we kept running into the issue that our clients have all preferred results over “valid” and “reliable” metrics. Therefore, we have also built and “trialed” instruments with clients that measure both the internal (“below the waterline”) capacities, character styles (and individual consciousness) as well as external (“above the waterline”) context interfaces, competencies, behaviors and results of individuals (leader profile, 360 CAP) and organizations (business sustainability scorecard). We are currently developing one for cities & communities (city & community sustainability scorecard) as well. Although these are far from perfected, it does seem that externally verifiable metrics that measure lead and lag indicators are easier to cross-check (by colleagues) and understand and use (by clients). If part of our intention is to get fully integral (IOS-based) instruments and metrics in widespread use, we need to create and sell instruments, and “packages” of instruments (blatant plug for collaboration) that covers the full range of the IOS and are appealing to clients and potential clients (e.g. provide measurement of results). For example, if a potential client wants us to help them develop a leadership and engineering team that can produce a new eco-car that will outsell the Toyota Prius and reduce energy consumption by 15% and raw material usage by 10%, it is better for everyone involved if we can say more than “the cultural center-of-gravity of your organization is ABC, a requisite version of your organization would be DEF, the action logics of your leadership team are GHI, and your LDMA results indicate that your should focus on improving JKL next.” It is beneficial if we can say something like: “Your current financial, social and ecological results are MNO (cohesion/sustainability stages) while your mission, targets and value-chain requires them to be PQR (context interface). This requires A-L (capacity shift above), changing from a production and sales focus to a value-chain integration focus (character/culture) and building STU competencies in your leadership and R&D teams (competencies) while increasing employee loyalty by X% in this economic environment by building a reputation day by day of becoming a truly sustainable organization (consciousness). All of this indicates that we should do VWX to get that car built.” And then follow up every 3-6 months showing them the improvement in both lead and lag indicators—including the actual financial, social and ecological results. If we do this with an increasing number of corporate, governmental and NPO clients, our hypothesis (and experience) is that the interest in developmental models and instruments (with their associated metrics) will continue to increase.

3. Creating an Evaluation System for Models, Instruments and Metrics: Stein & Heikkinen (2009) call for “languages of evaluation that focus on the most important qualities that bear on

the worth of both metrics and models” (p. 13). Interestingly enough, once the evaluation is complete, the “last metrics standing” are the Lectical Assessment System (LAS) instrument (which is directly linked to Stein), the Hierarchical Complexity Scoring System (HCSS) instrument (which is noted as “an early version of the LAS”), and perhaps the Requisite Organization (RO) model (it is noted that the creator of RO, Jacques, and his colleagues drew parallels between their metrics and those of Fischer and Commons, whose work serves as the foundation for the HCSS and LAS). Hmmm, this self-promotion is rather like ourselves and the 5C framework. OK, so we can all acknowledge a strong “T/Achiever/Orange” streak in at least several members of our budding community. On the other hand, certain other members of the community (e.g. Cook-Greuter and Beck) seem to be less interested in leveraging that T/Achiever/Orange streak. Combining this issue of “wisdom with limited self-promotion” in some members with the need to create an evaluation system that is meaningful to clients as well as colleagues leads us to add a few categories to “Table 2” in Stein & Heikkinen (2009, pp. 17-18). Again, our hats off to them for initiating this part of the process. We are certainly not experts in psychometric quality, and therefore look forward to partnering with community members who are. As stated before we do stand by our experience with several large-scale interventions and wide-ranging work with hundreds of organizational leaders. So, by leveraging our community’s diverse perspectives, we should be able to come up with a concise and powerful evaluation system. We suggest:

1. Expanding “metric” to “model,” “instrument” and “metrics” (see above).
2. Adding “scope” since most models, instruments and metrics can be used with either individuals or groups (it is neither time nor cost effective—and usually inaccurate—to “roll up” dozens or 100s of LAS or MAP instruments into a composite “organizational culture baseline” score) and some collective-focused instruments are built to assess an organization, but would not work with a city.
3. Adding “indicators” since listing the lead and/or lag indicators provided makes it easier to see what the model or instrument is measuring.
4. Adding “5C categories” since our developmental assessment of organizations and selection planning of candidates above Senior Manager roles should include their current, target and growth in context interface, character/cultural style, competencies, consciousness and degree of coherence as well as capacity (see #2 above).
5. Adding “language” since most instruments are available in only a few languages and some may not work across language barriers (e.g. sentence completion tests do not work grammatically in Japanese in our experience).
6. Expanding the content of “source” by adding feedback and perspectives from value-chain stakeholders in addition to academics.
7. Changing “publication type” to “evaluation type” and expanding the categories to include fieldwork (e.g. “pre-test with colleagues,” “focus group,” “client trial”).

8. Expanding “aspect of psychometric quality addressed” to “reliability & validity” (see Issue #4 below).

We add these categories to Table 2. Sources not found in the References section are found in Stein and Heikkinen (2009).

4. Clarifying and Increasing the Validity & Reliability of Instruments, Models & Metrics: Stein & Heikkinen (2009) are clear that they are focusing solely on developmental psychology models and metrics based on linguistic responses (and all instruments and models in their article deal solely with Core Capacity). Within these parameters, they seem to be concerned about the validity and reliability of the instruments, models and metrics they discuss (again, with the exception of the LAS, HCSS and RO). This is an extremely important point, especially if we work solely with Core Capacity-focused, linguistic-based, developmental psychology instruments and market to and work with our clients consistently from a “T/Achiever/Orange” point of view that assumes “the truth is out there” and can be disclosed by one or more instruments. This is a conundrum that we have not often shared, since in virtually all work with clients to date (after a single, mutually-traumatic experience with a former key client), we have mitigated this risk using one or more of the following practices:

1. Provide the client with a “Quality of Results Rating” (QORR) that shows the rough reliability of the instrument alone and when packaged with other components. This is all we have done to date when the client is purchasing only the instrument results (more than 99% of our clients to date have purchased packages such as leadership coaching, executive development, OD or change management rather than single instruments). Since over 99% of our hundreds of clients have chosen packages, the QORR is based on the results of our instruments cross-checked against longitudinal scores from multiple instruments, observations and lag indicators and cross-checked against what the clients DO and GET (see #3 below).
2. Provide scheduled time for our scoring team community of practice (COP) to consistently refine and granulate the categories that we make within our meta-model and use within our instruments to define specific metrics. Our COP also consistently cross-checks our meta-model and categories against evolving and new models, metrics and instruments that claim to measure the same things, engages in learning from thought leaders, and engages in dialogue with key colleagues. These are our primary ways of dealing with validity.
3. Engage the client in a “5C” dialogue that helps identify “where they are,” “where they are going,” and how we can be most helpful in their journey. Although this often involves Core Capacity transformation (since most of our clients are G, I or T people in the roles of intercultural managers (requires “H” results) or multi-national organizational leaders (requires “A” results), it also almost always involves some combination of Consciousness, Context Interface, Character, Competencies and Cohesion since the key phrase here is “requires results” and NOT “requires Core Capacity.” We have found (learned in our traumatic experience and verified in every case afterwards) that even “pre-conventional” leaders like to discover for themselves

“where they are” and not be told by consultants who are not actually responsible for the results themselves. We are speaking here of the organization leaders we have encountered, and cannot confirm whether this pattern holds true in the general population.

4. Provide three forms of feedback: what the clients have done (DO) and the results they get (GET) in addition to what they say and what judge of their interior from how they respond on instruments (BE). This provides a very concrete form of “tangible to intangible” or “visible to invisible” reliability cross-check to use the 4Q Iceberg model. Since “psychometric” checks deal only with intangible (internal) reliability and validity and does not include the reliability & validity of tangible results such as those provided by lag indicators (e.g. profits increased, increased number of lives saved, tons of carbon sequestered, etc.), we suggest expanding our definition of “development” to include tangible/visible measurement as well.

To summarize, developmental models, metrics and instruments need to be about more than stage development measured by (even calibrated) Core Capacity-focused, linguistic-based, developmental psychology metrics that produce lead indicators and are shown to be reliable and valid by psychometric qualities alone. Development, client satisfaction, and contribution to our communities additionally have benefited greatly from a cohesive 5C approach with clear, verifiable real-world results. A community that addresses these issues and produces a systematic and clear overview of which instruments, models and metrics best (or even moderately) provide tangible value to which clients in what contexts and conditions and works to improve the instruments, models, metrics and overview is the community that we want to co-create with you. As a first step, we end this article by building on Table 2 from Stein and Heikkinen (2009) and the invitation to help us continue to evolve this work together.

Warm regards, Chad, Norio and Zach.

Table 2. Capacity Models and Instruments

Model	Instrument(s)	Scope	Metrics/5C Categories	Indicators	Type
Abundance / Sustainability	Organizational Sustainability Scorecard	Team Organization	Context Interface, Core Capacity (14 sustainability lines)	Lead + lag	Certified objective scorer + self-scored (tangible)
	City & Community Sustainability Scorecard	City/Community Region	Context Interface, Core Capacity (14 sustainability lines)	Lead + lag	Certified objective scorer + self-scored (tangible)
Cultural Transformation Tools	Individual Values Assessment	Individual	Core Capacity (values line), Character	Lead	Self-scored (intangible)
	Leadership Values Assessment	Individual	Core Capacity (values line), Character	Lead	Self-scored (intangible)

Model	Instrument(s)	Scope	Metrics/5C Categories	Indicators	Type
	Small Group Assessment	Team	Core Capacity (values line), Character	Lead	360 (intangible)
	Cultural Values Assessment	Organization Nation	Core Capacity (values line), Character	Lead	360 (intangible)
Developmental Model of Intercultural Sensitivity (DMIS)—by M. Bennett	Intercultural Developmental Inventory (IDI)	Individual	Core Capacity (intercultural line)	Lead	Self-scored (intangible)
Constructive Developmental Framework	Developmental Assessment (Cognitive + Emotional/Social + Need/Press)	Individual	Core Capacity (whole + emotional & social lines), some Consciousness, some Context Interface	Lead	Certified objective scorer (intangible)
Ego Development	SCTi/MAP	Individual	Core Capacity (whole)	Lead	Certified objective scorer (intangible)
Leadership Capacity	360 CAP	Individual	Competencies, some Core Capacity	Lead + lag	360: Self +4-10 (intangible + tangible)
	Leadership Interview	Individual	Core Capacity (whole), some Competencies	Lead	Certified objective scorer (intangible)
	Leadership Questionnaire	Individual	Core Capacity (whole), some Competencies	Lead	Certified objective scorer (intangible)
	Leader Profile	Individual	Competencies, Core Capacity (whole), some Consciousness, some Context Interface	Lead + lag	Certified objective scorer + 360 CAP results (tangible + intangible)
	Team 360 CAP	Team	Competencies, some Core Capacity	Lead + lag	360 (intangible + tangible)
Leadership Development Framework	Leadership Development Profile	Individual	Core Capacity (whole)	Lead	Certified objective scorer (intangible)
Lectical Assessment System	LERA, LLRA, LDMA, LRJA, LSUA, LIMA, LMLA, LMSA	Individual	Core Capacity (cognitive line, other?)	Lead (lag?)	Certified objective scorer (intangible)?

Model	Instrument(s)	Scope	Metrics/5C Categories	Indicators	Type
Requisite Organization (including Complexity of Mental Processing—CMP)	Requisite Organization Platform by ROII. No instruments found by GO Society.	Organization (Jacques' original work could also be used with Individuals)	Core Capacity (cognitive line, other?)	Lead (lag?)	Certified objective scorer (intangible)?
Spiral Dynamics	Values Test	Individual	Core Capacity (values line)	Lead	Self-scored (intangible)
	Change State Indicator	Individual	Core Capacity (values line)	Lead	Self-scored (intangible)
	CultureSCAN-- Personal	Individual	Core Capacity (values line)	Lead	Self-scored (intangible)
	ManagerSCAN 360	Individual	Core Capacity (values line)	Lead (lag?)	360(intangible)?
	BusinessSCAN	Organization	Core Capacity (values line)	Lead (lag?)	360(intangible)?
	SchoolSCAN	Organization		Lead (lag?)	360(intangible)?
	CommunitySCAN	Community	Core Capacity (values line)	Lead (lag?)	360(intangible)?
	CultureSCAN	Team, Organization, Community, Nation	Core Capacity (values line)	Lead (lag?)	360(intangible)?
(Subject-Object Theory?)	Subject-Object Interview	Individual	Core Capacity (whole)	Lead	Certified objective scorer (intangible)

References

- Barrett, R. (1998). *Liberating the corporate soul: Building a visionary organization*. Boston: Butterworth-Heinemann.
- Barrett, R. (2006). *Building a values-driven organization: A whole-system approach to cultural transformation*. Boston: Butterworth-Heinemann.
- Beck, D.E. and Cowen, C.C. (1996). *Spiral dynamics: Mastering values, leadership and change*. Oxford, England: Blackwell.
- Bennett, M.J. (2004). Becoming interculturally competent. In Wurzel, J. (Ed.). *Toward multiculturalism: A reader in multicultural education*. (2nd ed.). Newton, MA: Intercultural Resource Corporation.
- Cook-Greuter, S.R. (1999). *Postautonomous ego development: A study of its nature and development*. Doctoral Dissertation. Harvard Graduate School of Education.
- Cook-Greuter, S.R. (2002). *A detailed description of the development of nine action logics—Adapted from ego development theory for the Leadership Development Framework*. Update of Doctoral Dissertation. Self-published.
- Cook-Greuter, S.R. (2004). Making the case for a developmental perspective. *Emerald Industrial & Commercial Training*. 36 (7) 275-281.

Developmental Testing Service website. www.devtestservice.com (see About Assessments)

Jacques, E., & Cason, R. (1994). *Human capability: Study of individual potential and its application*. Fall Church, VA: Cason Hall.

Kegan, R. (1994). *In over our heads: The mental demands of modern life*. Cambridge, MA: Harvard University Press.

Laske, O.E. (2006). *Measuring hidden dimensions: the art and science of fully engaging adults*. Medford, MA: Interdevelopmental Institute Press.

Rooke, D. and Torbert, W.R. (2005, April). Seven transformations of leadership. *Harvard Business Review*.

Ross, S. N. (2008). Using developmental theory: When not to play telephone games. *Integral Review*, 4(1) 31-46.

Stein, Z & Heikkinen, K. (2009). Models, metrics and measurement in developmental psychology. *Integral Review*, 5(1) 4-24.

Wilber, K. (1995). *Sex, ecology, spirituality: the spirit of evolution*. Boston: Shambhala Publications.

Wilber, K. (2000). *Integral Psychology*. Boston: Shambhala Publications.

Wilber, K. (2006). *Integral spirituality: A startling new role for religion in the modern and postmodern world*. Boston: Integral Books.

Interkonnections is a team of change leaders committed to helping our clients evolve their organizations, leadership and talent in ways that sustain and create value economically, socially and eco-systemically at both the global level and the communities within which they operate. We do this by working with them to create a cultural and systemic tipping point of abundance where together we are able to continually improve performance and generate added value along a triple bottom line of prosperity, people and place for ourselves, our organizations, communities, cities and the ecosystems that sustain us. We do this to help meet the changing needs of our clients and communities in the 21st Century, and leave the world a better place for our children.

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Intuiting the Cognitive Line in Developmental Assessment: Do Heart and Ego Develop Through Hierarchical Integration?

Tom Murray

Introduction

Numerous times in voice and in print I have heard people question whether Dawson and Stein's work using the Lectical Assessment System (LAS), and whether other developmental instruments, are only focused on the "cognitive line," as opposed to other instruments that are somehow broader. Stein has tried to clarify his perspective on this question in (Stein & Heikkinen, 2008), but the question seems far from settled. The issue came up again in the "meeting of developmentalists" hosted by Bill Torbert on October 3, 2009, which is reported on elsewhere in this issue (personal communication with Bill Torbert; I was not in attendance). Dialog about this issue seems confused by an assortment of assumptions, and the question itself of whether certain instruments measure only "the cognitive line" includes too many assumptions to allow for resolution without a deeper exploration of these assumptions.

Inspired by Stein and Heikkinen's (2009) paper in our last issue and the responses in this issue, I would like to take the opportunity to reflect on these assumptions, and on developmental assessment in general, with the hope that it will help in some small way to clarify or promote further dialog on the subject. As a Response essay, the arguments presented here are not backed up with numerous references to the literature that a scholarly article would be. My goal is not to enumerate, critique, or even adequately describe the assessment instruments currently in use in the community, nor is it to posit solutions to the complex problems of developmental assessment. My aim is to raise general questions, identify assumptions, and propose useful distinctions.

In particular, I take up several issues that I hope to be able to explore in more depth in a future academic article. First, I consider what it is that we are trying to measure in our assessments. Stein and Heikkinen (2008) approach this question productively from the perspective of the intuitive construct of "altitude," but here I approach it from the perspective of intuitions about wisdom.¹ Wisdom intuitively includes development of heart, soul, and ego, in addition to cognition. Second, I explore various definitions of "the cognitive line" and suggest that we keep in mind the limitations of even supposing that we can cleanly identify precise developmental lines independent of pre-defined tasks. I explore what we might actually be concerned with underneath the question of "is an assessment limited to the cognitive line"? Third, I discuss the limitations of models and relate that to hierarchically structured formal developmental models. Constructs such as reflective abstraction, hierarchical integration, subject-object transformations,

¹ I am of course not alone in taking up the topic of development by referring to wisdom. For example see Cook-Greuter (2002).



and hierarchical complexity assume a particular (different, but similar for my purposes) "mathematics" of developmental growth.

Fourth, I ask whether the development of heart, soul, and/or ego might follow a type of mathematics (geometry or logic) that is different than that captured by existing formal theories of hierarchy. Finally, I question whether, until we have better theoretical and formal models, we might have to rely heavily on human gestalt capacities to recognize some aspects of the development of wisdom.

Development as Wisdom

As noted by Stein, Dawson, Cook-Greuter, O'Fallon, and many other developmentalists, development (and in particular so-called vertical development) is a construct that first and foremost points to a vague but definite shared intuition that people have about increasing adequacy and capacity to act skillfully in life situations.² Human development and learning happens in countless ways in response to countless life-based task demands, but within the field of adult development, and especially within the integral community, the kinds of development we tend to be interested in are captured by the concept of *wisdom*. In the domains we look at, including leadership, parenting, communication, collaboration, spiritual work, counseling, and teaching, our intuitions of higher stages of development correspond closely with our concept of wisdom.³ The skills of ego-awareness (or ego development), construct-awareness (related to Basseches' (1984) dialectical intelligence), systems- or big-picture thinking, and social/emotional intelligence are all (and *together*) directly implicated (even synonymous with) modern day intuitions about wisdom. The usefulness of the construct of wisdom for the purpose of this essay is that it speaks to the strong interrelatedness of the various developmental lines that, in order to further our inquiry and understanding, we must also speak of separately. But these separate lines are somewhat arbitrary.

And along similar lines of reasoning, the developmental assessment instruments being used within the integral community (applied to leadership, coaching, communication, education, personal growth, civic engagement, etc.) can be seen as triangulating various aspects of wisdom.

² Cook-Greuter and Dawson both use an informal card-sorting activity to illustrate developmental intuitions. The audience (usually working in small groups) is asked to sequence a set of statements about a topic such as leadership or the good life. Invariably, on average people have surprising agreement about the hierarchical sequencing of the statements, pointing to a shared intuition. This is the core of Habermas' concept of *rational reconstruction*, or reconstructive science, in which the role of philosophy is seen as exposing the conditions and structures behind common intuitive constructs that are unconsciously or unreflectively used; and then to inform how inquiry in the empirical sciences is framed and conducted. Thus for constructs such as human development, freedom, respect, sincerity, and truth, the philosopher's role is to explore what is always already at their core, as they are actually used and experienced, rather than to uncover some platonic truth or reality about their nature.

³ We can note that what counts for a wise action or a person one admires as wise depends upon one's developmental level, yet, as with other developmental phenomena, though one can't easily "see" phenomena at levels higher than one's own level in a particular skill domain, developmental growth trajectories can be empirically demonstrated.

Though some of the frameworks, especially those looking at deep structure, are applicable across many domains, I am interested here in the life/relationships/work domains mentioned above.

What is the Cognitive Line?

Is the LAS, or any other instrument, confined to measuring "the cognitive line?" First, we should understand that the "cognitive line" is a man made construct that correlates with and helps categorize certain types of behavior and mental processes, but does not represent any known distinct component or function in the brain (or mind/body).

Kurt Fischer's (1980) Skill Theory supports the assertion that the act of differentiating complex human capacities into separate skills or lines is largely artificial. Fischer claims that skills develop in response to the demands of real life task situations: "the skill level that a person displays...cannot be considered independently of the context in which that skill is assessed."⁴ Some primitive human skills such as those dealing with reproduction, eating, and territory, seem to operate fairly *independently* because the task situations or life-needs they address are relatively independent. But the complex human social contexts of communication, decision making, and knowledge building have massively overlapping characteristics such that the skills developed to meet these needs should be expected to be equally *interdependent* and difficult to separate. Torbert and Livne-Tarandach (this issue) also describe evidence that as skills become more complex (i.e., at higher developmental levels) they become more entangled.

Often, measuring development involves creating tasks for people to do (e.g., respond to open-ended interview questions or sentence completions). These tasks are designed explicitly to be able to reveal developmental differences, so from the start they are based on some theory of development. In a sense the task itself defines a pseudo-line of development. This is not to say that the tests currently being used are not relevant to the real life skills we are concerned about (see Torbert & Livne-Tarandach for correlations with authentic outcomes). The point is that artificial tasks such as answering interview or assessment questions define their own quasi-artificial lines of development that seem distinct because the task is well-defined.⁵

Since an objective "cognitive line" function of the mind is not seen as an ontological reality, the question of "what is cognitive" reduces to what do we mean by cognitive in this context. It is beyond my scope here to explore the possible senses of the word, but we can pilot around the word to get a sense of what people are really pointing to when they refer to "the cognitive line." *Cognitive* can refer to the information processing part of the mind/body; to simply what we are

⁴ Fischer & Farrar, 1987, Page 647.

⁵ As is always the case in measurement, there are tradeoffs between authenticity (ecological or external validity) and reliability (or internal validity). That is, to the extent that the task is similar to an authentic real life action situation, like participating in a job interview, the "line" that the task defines is more relevant to wisdom skills. Yet more authentic tasks are complex and may be difficult to measure and interpret. So it is more prevalent to use artificial tasks such as answering questions on a form or in a structured interview, which are easier to score, and also define "cleaner" lines, but these lines are less guaranteed to relate to real life. The artificiality of tasks varies among the currently used assessment instruments, and some methods do not involve "lines" at all. Also, in commercial (non academic) settings, the cost of coding or assessing authentic tasks can be prohibitive—another tradeoff.

aware of (in the conceptual and developmental sense) such that we can even think about it (process information about it); to the logical rational functions of thought closely related to the classic notion of "intelligence" (IQ), and to the aspect of thought that is interested in determining what is true about the objective world (for physical-plane survival and "thrival").

The question of what is cognitive can also be illuminated by looking at its complement—when we categorize something as cognitive we are categorizing other things as non-cognitive. This brings us to the related question that inevitably comes up about the limits of assessing exclusively language-based performances. When we say "cognitive" in the context of our focal question, we are pointing to that which we know explicitly and can speak about. So underlying questions about the limitations of cognitively-oriented or language-oriented assessments are likely to be concerns about activity in the following categories.⁶

1. *Action*. Human development might be best measured according to what we *do* and *can* do, rather than what we say, or what we think we can do. Assessment questions that ask one to reflect on oneself (which statement is most like you; do you agree with the following...; are/do you....) are clearly limited by self-knowledge and what one wished one was like. And even for accurate assessments of self, there can be large performance-competence gaps and context dependencies that lead to an unintentional focus on ideal situations.
2. *Language skill*. We must ask whether we are in part measuring the ability to express oneself in language. Some of those we see as wise are rather quiet, speak in simple terms, or speak through action and non-reaction. And yet, if we evaluated how they responded to complex social, or interpersonal situations we might infer that choosing the one action among the infinite possible actions required a developmentally sophisticated understanding of the complexities, nuances, and dimensional levels of the situation. Perhaps a focus on speech-acts limits our exploration of wisdom (and related developmental lines) to those who are acculturated to be like us, who travel in academic (or organizational development, or upper middle class, or male-dominated, etc.) circles, and like to read and write and argue about their passions. Then again, communication is an action and skill in itself, as well as a medium, and certain aspects of what I am calling wisdom skills relate directly to communication skill.
3. *The non-conscious*. By far the bulk of who we are and what we do arises from non-conscious processes, including both repressed information in the Freudian sense, collective or archetypal patterning in the Jungian sense, social and historical conditioning, and the sorts of pre-conscious automatic processes that cognitive psychologists study (and described in Gladwell's *Blink*). These deep processes are mostly beyond our awareness and reflection, though they are evidenced in action, speech acts, and the conscious content of private thought processes.⁷

⁶ These questions are being addressed in the literature in various ways; I am not by any means the first to pose them, my goal is to summarize the main themes.

⁷ Note that if our goal is to reflect upon and improve or transform human behaviors can capacities, then we must make efforts to expose and describe what is tacit, both to be able to reflect upon it, and to design educational/transformational tools.

4. *The non- or post-rational.* The wisdom-skills of life are clearly about more than logical rational thought or linguistic competence. Adult developmental research is illuminating post-rational forms of thought that understand the strengths and weaknesses of both logical/rational/categorical thought and non-rational modes (e.g., emotional and intuitive forms), and produce post-rational decisions about when and how to use these different modes. Though post-rational thought can be seen as imminently rational, the question remains as to whether combinatorial and integrative models can formally represent types of understanding that reflect upon what is unknown or paradoxical, or chaotic.⁸

The above does not answer the question of whether the LAS or any instrument is limited to the cognitive line, but provides some concepts to help clarify the question itself and perhaps to ask more productive questions.

Deep Structure and Hierarchical Development

The LAS, developed by Dawson, combines aspects of the Hierarchical Complexity Scoring System (developed by Commons and colleagues) and Skill Theory (developed by Kurt Fischer), which are both early members of the neo-Piagetian generation, building on Piaget's (2001) theory of reflective abstraction. Dawson was a primary student and co-researcher with both of these leading figures in adult development. All three of these systems are based on content-free developmental models that look (and make assumptions about) the deep structure of development, rather than surface elements.⁹ A formal structural model is like a mathematics—like a type of logic or geometry, a formal system for representing how elements are combined and how new elements and patterns emerge from their combination and/or interaction.

Such formal systems representing growth, development, or learning use a variety of operators, including integration and differentiation, abstracting or generalizing common properties, and the coordination of lower schema. As one sees in all formal systems (including simple algebra and geometry and more elaborate systems in chaos and systems theory) very complex multi-layered structures can be built up from a few simple operators acting recursively. Also, since higher level schema are seen as single units abstracting or coordinating lower level ones, there can be a type of simplicity emerging from complexity as complexly-related units organize (or reorganize) into new wholes through successive differentiation and integration.¹⁰

⁸ Dawson (personal communication) argues that much of the territory of post-rational and non-rational reasoning can indeed be examined using hierarchical complexity: "The research clearly suggests that HC explains a great deal of what is going on here... One way to figure out what is NOT explained by HC is to parse out the HC dimension of performance. For that, you need a good HC ruler that goes straight to the core of HC... Once you have accounted for HC, then you can examine what's left—we find biases & preferences, temperament, affect, and dispositions when we do this exercise."

⁹ The constructs of surface vs. deep are relative, and most developmental models claim to deal with elements that are deep and not on the surface, but the projects mentioned go the furthest in being based on deeper structures.

¹⁰ Neurons seem to build structure upon structure in a way that could explain reflective abstraction (or hierarchical integration, subject-object transformations, etc.), or at least act as a metaphorical bridge. Developing the ability to be aware of and reflect upon—or combine and coordinate, or generalize or

The exact structures, logic, or geometry of such theories does not matter for my purposes here. What does matter is that such theories explain development of all types, including the development of physical skills, communication skills, self-knowledge, social skills, linguistic skills, intellectual skills, domain-specific knowledge, through the lens of such formal models. Not only cognitive skills, but sensory-motor and social skills such as playing tennis or leading teams, and even the behavior of non-human animals, can be modeled using such processes. Such deep-structure theories can rightfully say that they are not limited to the cognitive, or any other line, or to linguistic behavior, in their most general form (i.e., as domain independent theories).

On the Limits of Models and Formal Systems

Next I would like to move into questions about the limitations that formal models, and all models, possess, as another way to approach questions that come up about various developmental models and assessment tools. I want to ask how explicit we can be about the limitations of our tools, both conceptual (as in models) and instrumental (as in metrics and assessment instruments). As those familiar with my writings on integral themes may know, I have a fascination with the limits of knowledge and thought, and touch on themes of indeterminacy (including uncertainty, ambiguity, and paradox) in most of my articles.¹¹ A minor concern is with the epistemic or ontological humility of acknowledging that a particular claim, model, theory, concept, or method has indeterminacies or limitations. We do often see this sort of humility in scholarly works. But what is of most interest are the possibilities that become available when we study the indeterminacies and limitations enough to be able to characterize them and to explicitly work *with* uncertainty, not just *within* it.

This is just the sort of thing that error bars or confidence intervals do in statistics. Statistics has studied the nature of uncertainty to a point where, along with the main truth claims made from data, we can also make definitive claims about the *limitations* of the main claim.¹² Statistics does this from a right-hand-side perspective (being about measurable objective realities), and what I am interested in (and I must admit that I am an amateur in this area, which goes deeply into psychological and philosophical territory) is taking this approach into the left-hand or interior realms—the realm of concepts, language, beliefs, models, and theories.¹³

abstract—existing cognitive content, is easily pictured as adding a new layer of neurons or connections that sense, measure, react to, coordinate or regulate a prior or "lower" layer.

¹¹ I spent decades working in areas of applied artificial intelligence where I was exposed to many theories of formalizing human knowledge, skill, and behavior; and to the progression of academic expectations in these areas as scholars became ever more aware of the true complexities of human behavior (and living systems in general, including animal behavior and social systems). This, in addition to my own work in "knowledge representation" and "knowledge acquisition," plus studies in psychology and philosophy, have made me acutely aware (overly sensitive?!) of the limitations in our attempts to formalize complex natural systems.

¹² Of course, there are uncertainties in our claims about statistical uncertainty, and the issue is recursive in a never-ending way. But just going this one level deeper provides significant value (going two or three levels deeper becomes so difficult to conceptualize that there are diminishing returns).

¹³ Lakoff and Johnson (1999) maintain that the constructs available to us from which to build our models (abstract concepts, structures, operators, etc.) are deeply metaphorical. These metaphorical building

That is, we know that conceptual categories and the models and theories that are built from them inevitably have fuzzy boundaries and diverse interpretations, and we know that our perceptions, abstractions, and generalizations are limited by various sorts of biases and distortions; lenses and filters. But we often share claims as if we did not know about these limitations. Indeed, in abstract (conceptual and non-measurable) domains it is not an easy thing to do—it takes tools we are historically just beginning to become acquainted with and effort that is in short supply to step back and evaluate the limits of one's claims with any sort of rigor. And the norms of modern scholarly discourse give little incentive to do so. But I propose that as we become more comfortable and familiar with the *nature* of various sorts of indeterminacy (including what Fisher and Stein (2008) have called "dark knowledge"), through findings in psychology and philosophy, and increase our familiarity with this terrain, we can expand meaning-generation potential and efficiency in a community of inquiry.

This allows for more nuanced dialog. For example, the concepts of mind and consciousness are quite problematic in their definition, yielding various types of arguments about their nature which are highly fallible and vulnerable to counterargument. Perusing the debated claims and counterclaims in the literature is dizzying. From the perspective of an interested reader not attached to a particular answer (i.e., myself) it seems as though so much ink is wasted when authors hold onto a particular definition and do not yield to the possibility of alternate perspectives.¹⁴ Another example is in the use of theoretical models such as AQAL.

As Wilber is quick to note, AQAL is a map and not the territory itself—it is a particular way of cutting up the infinitely complex, nuanced, and ineffable territory(s) of reality, useful for a particular set of purposes. This noting constitutes the type of humility I mentioned above. But the next step, not so often taken, is to say as much as one can about the nature of this way of slicing up the "pie" such that we can understand the limitations of this powerful conceptual tool. What does it assume that might not be true? What admits to alternative views? What types of phenomena are not adequately captured using this lens? What things fall into the fuzzy or gray areas between the crisp conceptual lines of the four quadrants (and the other categories such as states vs. stages)? My argument is that all models and theories would be more adequate if they were described and "delivered" with a meta-wrapper or boundary analysis explaining some of what is known about the limitations of the "map."

How does this relate to our current topic of developmental assessment? Developmental assessments, if approached from the perspective of pure metrics, are subject to uncertainties akin to the right-hand-side realm of statistics, and their indeterminacy is thus more understood and less problematic. But to relate a pure metric to anything of relevance, to say what its results *mean*, we rely on models (or other tools of interpretation).¹⁵ So we are back to the limitations of models.

blocks are both tools and lenses that reflect the sensory-motor (and other) primitive elements of our experience, as much as they reflect truths about the world.

¹⁴ For example, rather than "you are wrong" the dialog becomes more like "if one interprets the concepts [e.g., consciousness] in [...this...] way there is validity to what you say, but my focus leads me to interpret it [consciousness] in [...this...] way, which I claim is more useful."

¹⁵ Also, assessments are designed in the first place to serve the needs of a model or theory, so reevaluation of the nature of a model may lead to reevaluation of the nature of a related metric.

The models being developed using constructs such as hierarchical complexity and hierarchical integration are proving to be extremely powerful in uncovering deep structure, and helping explain and perhaps even predict developmental phenomena. This is in part due to their additional levels of formality. Increasing theoretical formality involves, among other things, making sharper conceptual cuts in the fabric of observed reality. The benefits of doing so are clear, as can be seen in the contributions of modern science and technology. However, in this post (or post-post) modern era, we are also increasingly aware of the limitations of formal systems to capture truths about reality. And, importantly, are beginning to become aware of the shape of or *nature of* these limitations (as in the uncertainty principle and Gödel's incompleteness theorem), in such a way that we can work *with* the uncertainty, not just be helplessly subject to it.¹⁶

Though I have some incompletely-worked-out ideas about what this might look like, for this informal article I will simply suggest that we put more effort into such "boundary analysis" as a way to compare, contrast, and combine the best of the current developmental models and assessment methods. Also, I should note that, though each formal model has its limitations, particular practitioners or projects sometimes use a combination of tools, each of which may compensate for the limitations of the others. For example, Dawson's (Dawson & Stein, 2008) "developmental maieutics" is about embracing multiple approaches.

The Landscape of Assessment Tools

Up to here my discussion has brought together ideas seen elsewhere in an attempt to help clarify and promote dialog and meta-reflection on the practices of making and using developmental models and instruments. Next I will slip into much more speculative territory, with the hopes that my intuitions and musings will lead to productive dialog rather than simply expose the limits of my experience in this domain (!).

The current landscape of developmental tools includes those that seem to have had very little if any assessment of validity,¹⁷ those, such as Cook-Greuter's and Torbert's LDP-related instruments, that have shown some validity (but perhaps do not raise to the standard of calibrated measures, as called for by Stein and Heikkinen), and those, including the LAS, that have shown

¹⁶ Of course, within the power of this new type of knowledge we are best maintain humility, as the recursive questions about indeterminacy have never ending depth.

¹⁷ These include many that are used in leadership and organizational development, too numerous to list here or single any out (but see Stein and Heikkinen's article in IR's prior issue). Presumably those using them believe that the value added in terms of generating meaning for clients outweighs the problems inherent in their lack of validity. I am very sympathetic with the cautions brought out by Stein and Heikkinen (prior issue), but hold out the possibility that in some cases soft metrics can be used in such a way that there is overall value added, for example in guided self-evaluation (and see the discussion of first, second and third person methods in Torbert, this issue). I am also sympathetic to the pragmatic reality that if an organization has found benefit for self and client in a "tried-and-true" instrument, there may be little incentive, nor even the realistic possibility, for them to fund the type of large scale research project needed to sufficiently validate the instrument. The potential to harm clients is very real and must be looked at squarely in each case. But it would be an overstatement to say that all non-validated instruments are harmful.

strong (calibrated) validity and are also based on a deep/formal developmental theory. It is the latter two categories that I am concerned with here.

My understanding is that Stein and Heikkinen (and others in the neo-Piagetian line) hypothesize that their formal frameworks could measure much of what the LDP and related frameworks are measuring, and do so in a more rigorous fashion; and that some of those using LDP-related tools believe that they are able to assess something that the more formal models do not (or cannot). Both "camps" if I can call them such, agree that the ultimate answer to these questions will come only through empirical work in comparing the systems (as Heikkinen (this issue) is doing now between the LAS and Kegan's SOI instrument). Such comparisons will be important and revealing, and I hope that resources become available to facilitate this happening.

In the meantime, I will speculate that it *may* be possible that the less formal frameworks may be looking at a wider range of phenomena than the LAS (paired with a developmental model) can easily accommodate (a counter argument would be that multiple domain-implementations of the LAS could cover the same territory—see footnote 5). There is often a tradeoff in assessment between rigor (precision, internal validity) and scope and real-life relevance (including ecological validity). This may or may not pertain to the differences in these methods, as future analysis will reveal.

The above discussion has laid groundwork for me to bring forth a question of whether assessments relevant to matters of heart, spirit, self, and relationship might have a different underlying structure or mode of development that is not captured by current hierarchical theories or assessment tools.

The Geometry of Growth of Compassion and Negative Capability

Consider again some common intuitions about the development of wisdom. Think about wise people and wise actions, and what it takes for any one of us to grow in wisdom. In addition to the accumulation of complexity and the concurrent simplicity that comes from combining elements into new wholes, there are elements of un-learning (subtracting), of letting go and emptying, and of opening. Some would say that the wise heart is spacious and non-attached. What kind of structural transformation does it take to achieve this type of skill? It may need to be explained with something other than hierarchical processes.¹⁸

Imagine a conversation with someone who you know to be quite intelligent but in this context is just not able to release his grip on a belief, or is not able to see a part of himself that all of his friends see clear as day and have been gently trying to point out, but he struggles with internal resistance. There is an insight available to him about himself, about others, or about life, that he will surely grasp as soon as he lets go. He has shown in other situations that he is capable of stepping back and reflecting upon himself, of seeing the larger picture, the complexities and nuances. He has already developed the capacity to do these things, so what is called for is not so much a building up but a letting go, a type of healing, or a moment of grace. The article by Sofia

¹⁸ Ross (personal communication) says that hierarchical models can in fact account for these types of phenomena. The issue may come down not to the limitations of models, but current limitations in the assessment tools, metrics, and observable tasks that we use in conjunction with our models.

Kjellström in this issue talks about Kegan & Lahey's Immunity to Change Process, which directly highlights the fact that the release of resistance, unconscious motives, and psychological "baggage" may be as strong a determinant of the speed of developmental growth in adults as the gradual processes of hierarchical and additive growth.

Or imagine the proverbial seeker who goes into a guided contemplative seclusion and emerges with a new radiance and lightness (and, yes, in this imaginary case, *can* hold onto these qualities when she descends the mountain and enters the "market place"). Take a moment to feel what it feels like to be in a place of compassion with others. To develop in compassion is to very literally feel a sensation of expansion or lightness within the heart-space. Growth in heart and spirit reveal a phenomenologically different space than cognitive growth, and it seems possible that the structural transformations happening inside the body (or body/mind/soul) happens according to a different type of mathematics or logic or geometry.¹⁹ It may be possible that this type of change calls for different mechanisms and metaphors than are currently employed by hierarchical models.

Another element of the growth of wisdom is our ability to deal with dissonance, uncertainty, ambiguity, and paradox. Such dialectical intelligence (see Basseches contribution in this issue), vision logic, or "negative capability" may also imply a different set of metaphors and formal operators than we are currently using. Though, this type of growth is much closer to the domains that hierarchical methods have been used to explore.

Intuition vs. Formality in Assessment Methods

Another issue brought up in comparing developmental assessment methods used in the integral community is the more holistic and hands-on process used by those who use scoring rubrics vs. the more formal methods used with the LAS. Does the subjective role or innate intelligence of the human rater have a positive or negative effect on validity and usefulness? The LAS method purports to be more rigorous in that it uses a more formal approach to skill representation, requires less subjective interpretation, and has less reliance on surface meaning than other methods. This would indicate that it may be more reliable in measuring the aspects of wisdom-skill that are structured according to hierarchical models. It also indicates that the LAS is stronger for measuring specific well-defined lines.

However, above I ask whether there are important elements of wisdom that are not so structured; that are structured in ways that we do not yet have adequate conceptual tools (concepts or metaphors) to formally represent. To the extent that we lack the formal tools to represent these aspects of development, we may need to rely more on human gestalt reasoning, which can recognize more complex or subtle patterns than current mathematical and computational tools can assess.²⁰

¹⁹ See the "The Coherent Heart" by McCraty et al. in this issue for research on the neurophysiology of the heart.

²⁰ My own work in artificial intelligence (backed up by many scholarly sources) has made me aware that in certain pattern recognition tasks the human mind far exceeds what we have been able to do with machines and formal algorithms (and vice versa, computers are better at some things).

The LDP-like tools used by Cook-Greuter and Torbert are sometimes said to measure the "ego development" line, but are actually measuring some combination of three or more quasi-lines (behavioral, cognitive, and affective-relational).²¹ Thus they are assessing some of the wisdom skills that I argue may have elements that do not develop according to hierarchical logics. It is possible that human gestalt capacities can evaluate development in these areas better than the more formal systems, given our current state of the art. The LAS is designed to measure one developmental "line" at a time, as opposed to the more holistic combination of quasi-lines assessed in the LDP. The LAS may not be able to assess certain aspects of wisdom that a more holistic method could. However, it should prove to be more rigorous at assessing the lines that it can measure.

Dawson's approach to developmental maieutics is not limited to the LAS. Importantly, the LAS can be used to measure the aspects of development that do grow through hierarchical complexity, and can thus reveal the outline of what remains with particular clarity (see footnote 8). And what remains can be analyzed using different methods.

Conclusions

Constructs such as reflective abstraction and hierarchical integration point to deep structural properties of learned behavior that have proven to be extremely useful for understanding human (and animal) learning of many types. I have focused on a particular set of human capacities that seem highly valued in the integral community—framed under the umbrella of wisdom skills. These include what has been called ego awareness, construct awareness, socio-emotional-relational skills, dialectical intelligence, negative capability, empathy, and compassion.

There is no doubt that much of what we observe as development in these skills can be described in terms of formal hierarchical models. It is also possible that growth in wisdom (not simply individual differences, but growth or transformation) in these ways can *not* be adequately described using current hierarchical models, and that this possibility is what is being referred to when people ask about whether certain assessments are too limited to the cognitive line. Alternative and complementary models or modes may need to be developed. In particular we may need to more fully articulate models that account for aspects of wisdom growth that involve letting go, unlearning, healing, or non-hierarchical expansion or enfoldment. I also suggest that, at the least, we would benefit from putting more effort into articulating the boundary conditions and indeterminacies of the models in use.

References

- Bassesches, M. (1984). *Dialectical thinking and adult development*. New Jersey: Ablex Publishing.
- Cook-Greuter (2002). *Ego Development: Nine Levels of Increasing Embrace* (unpublished manuscript available from Cook-Greuter & Associates at <http://www.cook-greuter.com>).

²¹ Cook-Greuter (2002) mentions behavioral, cognitive and affective-relational lines. In some of my writings I have described this terrain in terms of ego-awareness, construct-awareness, and interpersonal-awareness, and systems-awareness.

- Dawson, T. L. & Stein, Z. (2008) Cycles of Research and Application in Science Education. *Mind, Brain, and Education*, 2(2), 90-103.
- Fischer, K. (1980). A theory of cognitive development: The control and construction of hierarchies of skills. *Psychological Review*, 87(6), 477-531.
- Fischer, K. & Stein, Z (2008). *Dark knowledge: An era in history and a moment in the learning process*. Unpublished draft.
- Fischer, K. W. & Farrar, M. J. (1987); Generalizations about generalizations: How a theory of skill development explains both generality and specificity; *International Journal of Psychology*, 2, 643-677.
- Lakoff, G. & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to Western thought*. New York, NY: Basic Books/Perseus Books Group.
- Piaget, J. (2001; orig. 1977). *Studies in Reflecting Abstraction*. Hove, UK: Psychology Press.
- Stein, Z. & Heikkinen, K. (2008). On operationalizing aspects of altitude: An introduction to the Lectical™ Assessment System for integral researchers. *Journal of Integral Theory and Practice* 3(1), 105-138.

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Educational Crises and the Scramble for Usable Knowledge

Zachary Stein

Abstract: Quality-control efforts in the field of applied developmental psychology are just beginning. In this paper I set these efforts in a larger context to frame their significance and guide their direction. I argue that the challenges arising in the current post-national constellation are best understood as educational crises. The task demands of the global problem space increasingly outstrip available human capabilities. This situation is leading to a scramble for usable knowledge about education—defined broadly as any process intentionally undertaken to promote human development. There is a growing demand for techniques and technologies that catalyze the transformation of human capabilities; and this demand exceeds available supplies. Education becomes a growth market as specific types of human capabilities come to be recognized as scarce but valuable resources. This pressing global demand for innovative educational solutions and approaches has the potential to systematically distort the production of relevant usable knowledge. I present a set of general quality-control challenges that face the field of applied developmental psychology as it strives to meet the demands of a globalized crisis-ridden educational marketplace. I argue that the field should overcome temptations to circumvent peer review processes by going directly to consumers. I suggest adopting a general stance of *epistemic humility* so that research and collaboration are promoted and argumentative strategies that insulate approaches from criticism are avoided. Finally, I argue that more careful attention should be paid to the normative dimensions of educational enterprises, as they involve the creation of new values and raise ethical questions about the shape of what life ought to be like.

Keywords: developmental psychology, education, post-modern global society, quality control, usable knowledge.

We Developmentalists

This paper is the third in a series of publications about applied developmental psychology (Stein, 2008; Stein & Heikkinen, 2009). In these publications my broad goal has been to start a serious discussion about the proper and improper uses of developmental metrics and models. Along the way I have had the good fortune to participate in exchanges about these issues with some of the greats, including: Ken Wilber, Susanne Cook-Greuter, Bill Torbert, Bob Kegan, Howard Gardner, Kurt Fischer, Michael Commons, and Theo Dawson. Now, with this special section in *Integral Review* my network of interlocutors has expanded once again. The responses to my efforts have made it clear to me that the quality control issues I have raised are important to many thoughtful people. Moreover, the tone of the discourse has made it clear to me that these are domestic disputes. We developmentalists are on the same team and want to find ways to work together to insure the knowledge we have gained gets put to use as ethically and efficaciously as possible. However, as I explain below, we need more than good intentions.



In his brief but insightful counterpoint Basseches (this issue) raises the specter of a “tyranny of measures” — a socio-political situation wherein psychological measures supplant respectful discourse and enable forms of institutionalized domination. I think that there is good reason to fear this as a possible future. As I have stated elsewhere (Stein, Dawson, & Fischer, in press) the majority of post-industrial societies have large educational systems dominated by complex standardized testing infrastructures. In some contexts the situation already resembles a kind of “tyranny of measures,” where psychological measures alone determine the distribution of opportunities and rewards. At least since the publication of *The Tyranny of Testing* (Hoffman, 1962) many have leveled broad and incisive criticisms of the testing industry. But, despite clear evidence that the approach is flawed (e.g., National Research Council, 2001) there is continual political push towards expanding the existing testing infrastructure. These expansions will inevitably infiltrate higher education and human resource management in business and government.

It is clear to me that the push to expand testing infrastructures should be seen as an errant response to profound challenges that face large sectors of society. Below I argue that the current post-national constellation faces endemic *educational crises* (see Figure 1), wherein the problems we need to solve outstrip our capabilities. Thus, echoing Habermas (1984; 1987) and Wilber (1995), I argue that viable solutions must entail the promotion of *learning processes*. We must find ways to foster the development of individuals who are *capable* of navigating the complexity of this historical moment. The ever-expanding testing industry is one face of current technocratic responses to this problem. The other face is an ever-expanding branch of the biomedical technologies industry that focuses on the “enhancement” of psychological functioning (see, Stein, della Chiesa, Hinton, & Fischer, in press). There is a pressing need for usable knowledge about how to affect the transformation of human capabilities and a sprawling set of markets is springing up around this need. If market mechanisms dominate the available supply of educational options, we may face not just the tyranny of a standardized testing industrial complex but also a brave new world characterized by large-scale strategic alterations of the human nervous system.

It is my hope that we developmentalists might be in a position to affect the trajectory of our society’s response to the educational crises it faces. This includes shaping the future of institutionalized applications of psychological measurement. It also involves engaging in research about how development is best fostered. And, I think, we also need to weigh in on the normative and philosophical issues at the heart of human development, clarifying which potentials are preferable and ethically vetting the means we are willing to employ to achieve them. But the complex context in which we make our efforts works against us.

Below, after clarifying the nature of the educational crises that constitute this context I discuss characteristics of our current knowledge production processes that might undermine our best intentions.

Educational Frontiers and Educational Crises

It has been suggested that with the closing of the American West early in the 20th Century education became the new frontier. Education came to be invested with the ameliorative and

utopian (and opportunistic and exploitative) energies that once characterized westward expansion (Kariyer, 1986). During the 19th Century the West exemplified the possibilities of American democracy. Its vast expanses and resources were understood as indispensable enablers of America's future as a land of opportunity, freedom, and equality. The "problems" of immigration and labor, of urban crime and poverty, of anomie and economic stagnation—these could all be solved by heading west, it was said, where the future of America was being forged, where everyone looked out toward an open horizon. Since the early 20th Century, so the argument goes, these same ideals and energies have been tied to the possibilities of education. Just as the West was once thought to make all things possible, so now education is saddled with the burdens of accomplishing democracy.

This is an important insight and one that is more significant today than when it was first expressed in the 1960s. But today an argument about the function of education needs to be more than a story about American nation building. It needs to shed light on the current post-national constellation. Familiar ideals—birthed in both Athens and Jerusalem—have catalyzed the global expansion of certain techno-economic conditions and moral-political orientations. The rule of law and democratic governance processes increasingly characterize societies worldwide. These are social changes typically accompanied by free market capitalism and industries built around scientific and technological innovation. As diverse and geographically distant markets and cultures have become irreversibly interconnected through increasingly complex communication networks, the most advanced nations in the world have come to share a common historical trajectory. Since the end of colonialism and the failure of the Soviet experiment there remain no alternatives to the dominant modes of political and economic organization (Habermas, 2001). This is just to say that major shifts in the trajectory of the total system, such as those needed to handle climate change and terrorism, are now possible only from within. In the context of this need for immanent self-transformation, it is education that saddles the burdens of accomplishing a just and sustainable global civilization. The educational frontier is trans-national.

Importantly, *education*, as I use the term and its variants here, signifies more than what happens in schools. Following Dewey (1916), Cremin (1976), and Habermas (1984; 1987), I think education is better understood as a broad socio-cultural function and form of human interaction. Dewey went so far as to say that all communication is educative, a view I have some sympathy with. But I will say instead that any intentional effort to promote human development is an educational effort. Or, put slightly differently, any initiative taken to affect a valued transformation of human capabilities is an educational initiative. So *schooling* is just one form of education—albeit a particularly important and powerful form. Coaching and psychotherapy would be educational initiatives according to this definition, as would professional development programs and most organizational consulting work. The publishing industry, television, film, and the Internet all have educational affordances and represent some of the most expansive possibilities on the current educational frontier.

So my argument is that education, thus broadly defined, serves a unique and powerful function in the emerging global civilization that surrounds us today. There are no major global challenges that do not have critical educational dimensions. Moreover, many key challenges are primarily educational in nature. This is just another way of saying that changing the trajectory of the total system requires changing how people think and act, which can only be done by finding

ways to affect valued and needed transformations of human capabilities. Human development is the elephant in the room when it comes to calls for systems level change.

This line of thought suggests that the climate crisis is actually a crisis of human decision-making, and that educational initiatives are as (if not more) primary and important than legal and industrial ones. A new generation of “green” voters and engineers must be fostered through educational initiatives; leaders must likewise come to think and act in more sophisticated ways. If the task demands of building sustainable systems and lifestyles are more complex than the capabilities of those asked to do so (which I think is the case, in fact) then no matter how much funding we throw at achieving sustainability, our efforts will fail. Building a “smarter planet” through technology (*a la* IBM) and policy (*a la* Al Gore) is necessary, but smart people are a prerequisite. Wilber (1995) suggested as much over a decade ago when he noted that the greatest threat to the biosphere is not industrial pollutants but rather the current low developmental level of human capability with regards to relevant decision-making domains.

This reading of the climate crisis displays what is actually a general trend in contemporary society, one noted by Wilber (1995), Kegan (1994), Habermas (1975), and Jaques (1970; 1976), among others. This is a trend toward educational crises of increasing prevalence and intensity. Figure 1 displays the general structure of an educational crisis. The displayed mismatch between demands and capabilities is ubiquitous in the post-industrial world, characterizing both the struggles of individuals and broad societal trends.

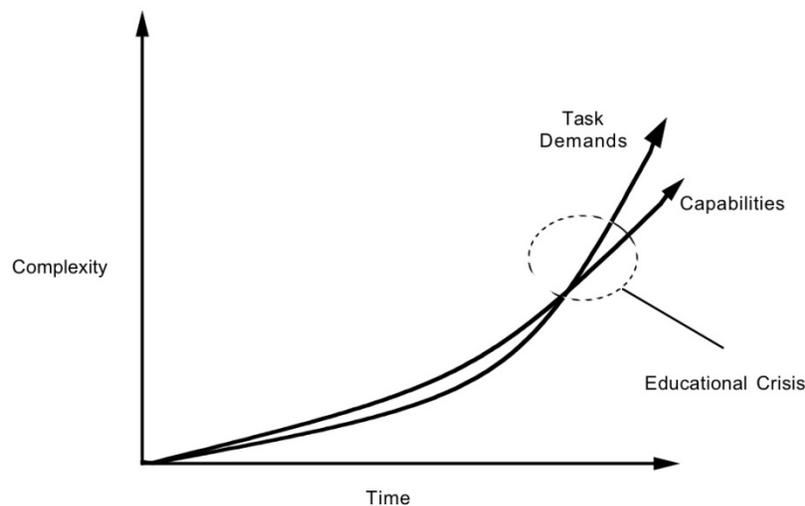


Figure 1: An educational crisis occurs when the complexity (diversity, quality) of task demands outstrips the available capabilities. This can happen to both individuals and societies. Based, with permission, on a comparable figure rendered by Carreira (2009).

The task demands of work and life outstrip individual capabilities on multiple fronts (Kegan, 1994). Rapid technology driven innovations and economic pressures shape the employment histories of individuals, disrupting stable patterns of competence and establishing the need for professional development and lifelong learning. Advances in biomedical technology and an increasingly unwieldy health care system put unprecedented decision-making demands on individuals and families, who must navigate ever shifting diagnostic categories, treatment

options, and the complexity of the insurance industries. Communication technologies enable expansive social networking opportunities that radically alter socialization patterns and identity formation. The construction of a continuous and coherent life-project is more demanding than it has ever been (Beck, 2001; Arnett, 2004).

Broad social trends also reflect educational crises (Habermas, 1975; 2001). The latest economic crisis is a case in point. Like the climate crisis it is perhaps best read as a crisis of decision-making. Debates in economics and politics have taken an epistemological turn, as many have come to question our very *ability* to understanding the global economy at all. This suggests that the task-demands of regulating massive trans-national markets outstrip the capabilities of those who seek to do so. Other fronts present comparable educational challenges. Executing an ecologically responsible redesign of energy systems requires accomplishing feats of engineering that are stunning in their scope and complexity. Global terrorism is, when viewed along these lines, a significant educational issue. Terrorist networks are, in fact, remarkably effective educational organizations. And the difficulties of inter-religious and cross-cultural conflict mediation and dialogue are primarily educational. If the task of constructing a just and stable world order demands more from us than we are capable of, then we must change the nature of our capabilities.

So education is a growth market—from self-help books, life coaches, and online universities, to Ritalin, the blogosphere, and Google. Large swaths of society are groping for ways to cope with the mounting complexities of the historical moment. But the demand for effective educational interventions far exceeds the supply of approaches that have proven effective. For example, snake oil salesmen already successfully broker so-called “brain-based” educational approaches to unsuspecting parents and teachers, making outlandish scientific-sounding claims about their products’ effectiveness. The presumed educative benefit of emerging information technologies (e.g., the search-engine, Wiki, blog, or e-learning module) is questionable, given the sheer quantity, diversity, and ambiguous quality of the content. Informational environments are *not* always educational environments (although educational environments *are* always informational environments). Biomedical technologies built to improve attention, memory, or emotional self-regulation are likewise unreflectively endorsed as effective, while the impacts of long-term usage are totally unknown. Psychotherapy, executive coaching, and professional development programs of various shapes and sizes are proliferating and testing the limits of what the market will bear as far as what qualifies as a useful learning experience.

This is the context in which the field of applied developmental psychology finds itself. With over 100 years of cumulative theory and research—from Baldwin through Piaget and Kohlberg to Fischer, Kegan, and Wilber—the field is uniquely positioned to address the current need for broadly effective educational innovation. However, existing cultural trends and market dynamics work to counteract the value and validity of what the field has to offer. Basically, as was just suggested, because the need is so great, it is easy to sell just about anything. Moreover, powerful political and economic forces have shaped mainstream efforts toward the aforementioned technocratic solutions combining standardized testing with biomedical technologies. For the field of applied developmental psychology to gain traction we must respond to the demands of this globalized crisis-ridden educational marketplace with a unique and powerful *modus operandi*. My calls for quality control, and the ensuing discourse (in this journal and beyond), should be

understood as attempts to articulate just what this might look like. The broad idea of an *Institute for Applied Developmental Theory* focusing on quality control and fostering collaboration—first articulated by Ross (2008) and echoed by Stein and Heikkinen (2009)—remains one of the best options. Below I continue to sketch the contours of preferable knowledge production processes with the hope of further helping knowledge workers in the field to build such a common mission and vision.

Building Useable Knowledge in a Time of Crisis

In prior publications I have noted the need for researchers and practitioners to hold developmental metrics to more rigorous psychometric standards (Stein, 2008; Stein & Heikkinen, 2009). This is a critical point for a variety of reasons, as Dawson's sketch of basic concepts in psychometrics elucidates (Dawson, this issue). Make no mistake, if we do not handle these foundational psychometric considerations we will remain on the sidelines as large human resource management agencies, test manufactures, and governments work to build educational infrastructures around approaches that can (ostensibly) prove the scientific-quantitative validity and reliability of their instruments. Importantly, quantitative and qualitative methods are not mutually exclusive; both can be transcended and included in more comprehensive and rigorous approaches to psychological research (Habermas, 1988; Dawson, Fischer, & Stein, 2006). The pursuit of psychometric rigor is *not* in conflict with the goal of "disclosing interiors" or providing rich, broad, and useful descriptions of psychological phenomena. But the explicit pursuit of psychometric rigor *is* a necessary but not sufficient component of any approach that aims to have an impact on current trends toward the large-scale institutionalization of psychological measurement. If we opt out of this task we will be relegated to the fringes, unable to address the arguments of those espousing more overtly reductionist-technocratic approaches. So the call for psychometric rigor is critical.

But we have more than psychometrics to worry about. There are a host of other issues with the potential to undermine our efforts at collaboratively building usable knowledge in this time of educational crises. Here I select three such issues and briefly elaborate what is at stake. These issues reflect my experiences with the current discourse. They should be taken as part of the collective ongoing efforts to outline best practices for developmentalists exemplified by this issue of *Integral Review*.

In general, the interface of academic research and real world application is a dynamic and difficult place to build knowledge (President's Council of Advisors on Science and Technology, 2008). Balancing the demands of the market or problem-space with the demands of academic rigor can strain efforts, typically leading initiatives away from the academy and toward the marketplace. Moves away from standard academic methods of peer review often warrant the creation of independent quality-control agencies to monitor knowledge production—such as the FDA for the biotech industries. However, there are an increasing number of fields moving from the academy toward the market that have not established non-academic methods for quality control (e.g., educational/psychological technologies, nanotechnologies, information technologies, etc.). If market mechanisms dominate the production of knowledge the impact of commodity fetishism is epistemological, creating a false consciousness of what is possible and

preferable. If the pressure to find workable solutions overrides care and due diligence then the solutions adopted may create more problems than they solve.

Peer Review Processes

The first issue I want to address concerns how the field of applied developmental psychology engages *peer review processes*. For many of us the goal is not to publish in order to secure an academic position or advance knowledge; the goal is to build knowledge so it can be put to use. Success is thus not gauged in terms of standard academic acumen. Rather, success resides in the ability to execute effective applications and garner support for the methods and approach. Put crudely, success is measured by whether the approach sells. If the approach sells, why take time and energy to publish in peer-reviewed journals? Moreover, so the thinking goes, it sells because it works and it works because it is true (or accurate, valid, reliable, etc.). However, as Marx pointed out long ago, the value and popularity of a product on the market is typically not a reliable index of its actual worth. Market dynamics should not be understood as a proxy for peer review.

The market value of usable knowledge about human development is contingent on a variety of factors. Academic credibility is one factor. But the relation between the academic or scientific value of an approach and its market value is not straightforward. In knowledge intensive applied fields, end users—clients, customers, consumers—are typically not in a position to evaluate the validity of academic or scientific claims about the product; we must take the pharmaceutical companies at their word because we don't understand biochemistry well enough to determine the validity of their claims. Applied developmental psychology is no different. End users are typically not in a position to interrogate the claims made about the effectiveness of approaches or the reliability of metrics. This situation is not necessarily a problem. The FDA serves my interests as a consumer of pharmaceuticals by standing in place of peer review processes. But in fields where the market is growing and there are no comparable agencies exercising quality control in place of peer review, problems can arise. Situations occur where the *appearance* of academic credibility creates more market value than actual academic arguments and practices. This is, I think, where we are at as a field, mainly as a function of the fact the education is a growth market; we are simply scrambling to meet demands.

None of this is to say that the peer review process as it is usually practiced is flawless. There are major problems with many peer review practices (see Tipler, 2004). They are typically slow and can be contentious. They often simply enforce orthodoxy and squelch innovative thinking. So I am, in fact, not suggesting that we developmentalists go through standard channels. Many of these channels are closed in principle to the approaches we endorse. Or they are prohibitively difficult and time consuming for non-academics. I'm suggesting that we institute new channels. Facilitating peer review and collaboration could be an important function of the aforementioned proposed *Institute for Applied Developmental Theory*. For example, Heikkinen (personal communication) has suggested the construction of an information clearing-house for developmental approaches. Guided by a shared set of standards—co-constructed and revisable—a rigorously and collectively edited ever-expanding web resource for consumers and practitioners could serve as a place to vet research and development efforts while also increasing transparency between various stakeholders.

In any case, the idea that serious intellectual work needs to be looked at from a variety of perspectives by a community of those capable of assessing its value is critically important. The understandable rush to meet the demands of immanent educational crises should not lead us to embrace less rigorous forms of knowledge production. If anything, the historical moment should lead us toward new forms of collaborative knowledge building. Our inability to forge these collaborations, and the related tendencies to circumvent peer review, stem in part from a *lack of epistemic humility* that characterizes large sectors of the field. This is the second issue I want to discuss.

Lack of Epistemic Humility

It appears that when the extramural construction of useable knowledge is accompanied by success and acclaim we are prone to overgeneralizations concerning the implications of what has been achieved. Already a set of models and metrics (not to mention their makers) have taken on an almost mythical status, leading some to voice explicit concerns about a kind of crypto-religiosity that haunts the field. This is, of course, related in part to a lack of peer review practices. The tentative, exploratory, and experimental attitude that allows for scientific advance and collaboration is not a prerequisite for participation in the field, as it would be if rigorous and collegial peer review were standard practice. But this lack of epistemic humility is also a unique liability resulting from the subject matter of applied developmental psychology. Because these models and metrics can be used to hierarchically rank human capabilities and dispositions they are often taken to heart—they become enmeshed in how individuals regulate their self-esteem. Moreover, because of the erroneous belief that “higher is always better” (more on this below) those who take certain models to heart position themselves and their models “at the top.”

This leads to curious argumentative strategies, strategies that insulate models from criticism (and thus improvement) and effectively cut off the possibility of collaborative and self-critical knowledge production. For example, I have encountered the following argument more than a few times. During a debate about aspects of a model, supporters of the model position the arguments of the critic (or the critic themselves) in terms of the hierarchy specified by the model being debated. The critic falls short of the level at which the model is claimed to have been built and is therefore deemed incapable of rendering meaningful arguments against it. In other words, arguments (or individuals) below a certain level—as specified by the model under discussion—are rendered second-class interlocutors, deemed intrinsically unable to offer cogent criticisms. I will call this an argumentative strategy that relies on *developmental disqualification*. It is a style of argument unique to this field and it insulates models from criticism by claiming that certain participants in the debate are developmentally disqualified from being taken seriously. This is reminiscent of the classic psychoanalytic quip that anyone who does not believe the basic tenets of psychoanalytic theory is simply resisting analysis. It is also similar to certain types of religious arguments that justify the faith by positing the delusory status of all of non-believers.

Arguments that rely on developmental disqualification commit the classic logical fallacy of *petitio principii*. They are question-begging arguments, presupposing what they set out to demonstrate. One cannot use an argument that assumes the validity of a model in defense of the validity of that model. These arguments also constitute an interesting sub-class of *ad hominem* arguments, and as such may be unethical as well. They convince only the ones making them and

leave those they are deployed against unconvinced at best, marginalized and silenced at worst. But regardless of their less than enviable logical qualities, they are simply unproductive. How can collaborative and self-critical knowledge production be advanced when certain types of contributions (or contributors) are systematically devalued?

Well over a century ago, C.S. Peirce (1869) argued that inquiry-oriented communication communities must have an open and inclusive structure predicated on trust, honesty, and reciprocity. Based on his extensive work as a scientist, logician, and philosopher, Peirce clarified the intersubjective conditions for the possibility of reliable knowledge production. Habermas (1990) and Apel (1996) have followed his lead, broadening the project so that it assumes the shape of a general *discourse ethics*. This lineage of theorizing clarifies the fact that systematically distorted forms of communication disfigure communities and undermine their efficacy. Developmentally disqualifying potential participants systematically distorts communication, creating an insular, self-congratulatory, and defensive in-group over against an out-group that has been deemed intrinsically unable to say things that matter.

But note the specifics. As mentioned above, I don't know enough about biochemistry to argue with drug manufactures about their research and development efforts. If I decided to voice an opinion anyway, say on their plan to target the metabolic pathways that lead to neurodegenerative disease, I would likely be misinformed or just plain wrong. This would reflect a lack of disciplinary expertise on my part. But, in this context, a lack of disciplinary expertise is not a disqualification; it just makes me more likely to be wrong or misinformed. Ideally, my argument would be heard, and then refuted, such that I would come to see my own arguments or knowledge base as inadequate. But to claim that someone is developmentally disqualified is to claim more than that they are misinformed, lack training, or are just plain wrong. It is to claim that they are intrinsically unable to produce arguments that count. This is a way of dismissing and silencing potential participants, as opposed to hearing them out and then addressing their arguments as arguments.

But arguments are arguments, regardless of the developmental level with which they are associated. Likewise, people are people. The systematically distorted forms of communication described above result from a lack of epistemic humility on the part of those who endorse certain developmental models. The idea that a privileged few possess some special knowledge is a perennial ideological motif. But wedding this ideological motif to usable knowledge in developmental psychology is a contemporary contrivance. Moreover, the dismissal of an argument, belief, or orientation solely because it is suspected to be the product of a certain developmental level reflects a profound *lack of clarity about the normative aspects of human development*. This is the third issue I want to discuss.

Lack of Clarity about the Normative Aspects of Human Development

J. M. Baldwin (1906) and Piaget (1970) theorized in an epistemological mood. Kohlberg (1981) was worried about the naturalistic fallacy. Harry Stack Sullivan (1964)—who Loevinger (1976) called the father of ego-development theory—understood the integrative powers of the self-system as ethically neutral, arguing against defining maturity in moral terms. The progenitors of our field did not assume that higher-level performances were necessarily more

valuable; they set out to test this belief, combining empirical and philosophical analyses. They limited their normative claims about development to well-specified areas of human capability, clarifying the developmental logic of certain specific learning sequences. And when they used prescriptive, normative, or ethical language, they did not draw it directly from the empirical substance of their models. Baldwin looked to Spinoza, Kant, and Schelling. Piaget looked to Kant and a host of modern formal logicians. Kohlberg looked to Kant, Dewey, and Rawls. Sullivan looked to G.H. Mead and Whitehead. This kind of division of labor between philosophy and psychology in the study of human development is important to maintain (Habermas, 1990), especially in the current context of educational crises.

Developmental models are made to describe and explain developmental processes (Stein & Heikkinen, 2009). However, as just discussed, some models have also come to serve an overtly normative function for many who use them. This means that conversations about what it means to be a good person, about human potentials that are admirable and worth striving for—conversations about the shape of a life that has not been misspent—have become conversions populated by terms from specific psychological models. Likewise, these same models provide the language we use to disapprove of beliefs and actions or to characterize others as unworthy of emulation. This is quite a burden to place on a psychological model, making it into a system that discloses the normative dimensions of personhood and facilitates the ethical ranking of individuals. Again, concerns about the crypto-religiosity of the field are well taken.

As I have argued elsewhere (Stein, 2008), the use of models from developmental psychology to determine the distribution of admiration, respect, and responsibility is wrongheaded both methodologically and ethically. This is not the place to rehearse these arguments, which hinge on the canonical differentiation of facts from values and a preference for democracy over meritocracy. Suffice it to say, one of the greatest risks to the integrity of our efforts is the misuse of developmental models as broad evaluative frameworks, or what Rawls (1996) would call “comprehensive doctrines” concerning the nature of human life and value. Since Freud first drew the analogy between analysis and confession, psychologists have had to avoid positioning themselves as a new priestly caste. In cultural contexts where traditional worldviews have been thrown into question by the disenchanting gaze of scientific rationality, there is a vacuum where religious self-understandings used to reside. Charles Taylor (1989) has diagnosed this as a lack of *languages of strong evaluation*—a lack of shared categories and distinctions about what makes a human life successful.

Developmental psychology should not aim to offer these kinds of categories and distinctions (nor is this the province of philosophical meta-theory). Ambitions along these lines reflect both a profound misunderstanding of psychology as a discipline and a remarkable naïveté concerning the genesis and grounding of our most basic normative commitments. No doubt, new values must be created if we are to navigate the immanent educational crises discussed above. But the creation of new values—the birth of a new comprehensive doctrine—cannot be engineered by social scientists (Habermas, 1984). The emergence of new worldviews takes place in the heart of the lifeworld; where vulnerable identities are forged under the pressures of unprecedented conditions and leaders and symbols emerge that embody a shared trajectory garnering broad consent and motivational force.

Conclusion: Summing Up

Quality-control efforts in the field of applied developmental psychology are just beginning. In this paper I set these efforts in a larger context to frame their significance and guide their direction. I argued that the challenges arising in the current post-national constellation are best understood as educational crises. The task demands of the global problem space increasingly outstrip available human capabilities. This situation is leading to a scramble for usable knowledge about education, which I defined broadly as any process intentionally undertaken to promote human development. There is a growing demand for techniques and technologies that catalyze the transformation of human capabilities; and this demand exceeds available supplies. Education becomes a growth market as specific types of human capabilities come to be recognized as scarce but valuable resources. This pressing global demand for innovative educational solutions and approaches has the potential to systematically distort the production of relevant usable knowledge. I presented a set of general quality-control challenges that face the field of applied developmental psychology as it strives to meet the demands of a globalized crisis-ridden educational marketplace. I argued that the field should overcome temptations to circumvent peer review processes by going directly to consumers. I suggested adopting a general stance of *epistemic humility* so that research and collaboration are promoted and argumentative strategies that insulate approaches from criticism are avoided. Finally, I argued that more careful attention should be paid to the normative dimensions of the educational enterprises related to applied developmental psychology, as they involve the creation of new values and raise ethical questions about the shape of what life ought to be like.

References

- Apel, K.O. (1996). *Selected essays volume two: ethics and the theory of rationality*. (Mendieta, Trans.) Atlantic Highlands, NJ: Humanities Press.
- Arnett, J. (2004). *Emerging adulthood*. New York: Oxford University Press.
- Baldwin, J. M. (1906). *Thought and things: A study in the development of meaning and thought or genetic logic* (Vol. 1-3). New York: Macmillan Co.
- Beck, U. (2001). *Individualization*. London: SAGE publications.
- Carreira, J. (2009). In a time of crises philosophy is not a luxury. Paper presented at the Integral Leadership in Action Conference. Austin Texas.
- Cremin, L. (1976). *Public education*. New York: Basic Books.
- Dawson, T. L., Fischer, K. W., & Stein, Z. (2006). Reconsidering qualitative and quantitative research approaches: A cognitive developmental perspective. *New Ideas in Psychology*, 24, 229-239.
- Dewey, J. (1916). *Democracy and education*. New York: The Macmillan Company.
- Habermas, J. (2001). *The post-national constellation* (Pensky, Trans.). Cambridge, MA: MIT Press.
- Habermas, J. (1990). *Moral consciousness and communicative action* (C. L. a. S. Nichol森, Trans.). Cambridge, MA: MIT Press.
- Habermas, J. (1988). *On the logic of the social sciences* (Nichol森 & Stark, Trans.). Cambridge: MIT Press.
- Habermas, J. (1987). *The theory of communicative action: Lifeworld and system, a critique of functionalist reason* (T. McCarthy, Trans. Vol. 2). Boston: Beacon Press.

- Habermas, J. (1984). *The theory of communicative action: Reason and the rationalization of society* (T. McCarthy, Trans. Vol. 1). Boston: Beacon Press.
- Habermas, J. (1975). *Legitimation crisis* (T. McCarthy, Trans.). Boston: Beacon Press.
- Hoffman, B. (1962). *The Tyranny of testing*. The Crowell-Collier Publishing Company.
- Jaques, E. (1970). *Work, creativity, and social justice*. London: Heinemann Educational.
- Jaques, E. (1976). *A general theory of bureaucracy*. London: Heinemann Educational.
- Karier, C. (1986). *The individual, society, and education: A history of American educational ideas* (2nd ed.). Chicago: University of Illinois Press.
- Kegan, R. (1994). *In over our heads: The mental demands of modern life*. Cambridge, MA: Harvard University Press.
- Kohlberg, L. (1981). From is to ought: How to commit the naturalistic fallacy and get away with it in the study of moral development. In *Essays on moral development vol. 1, the philosophy of moral development* (pp. 101-190). New York: Harper and Row.
- Loevinger, J. (1976). *Ego development*. San Francisco: Jossey Bass.
- National Research Council on the Foundations of Assessment (2001). *Knowing what students know: The science and design of educational assessment*. Washington, D.C.: National Academy Press.
- Peirce, C. S. (1869). Grounds for the validity of the laws of logic: Further consequences of four incapacitates. In Peirce Edition Project (Ed.), *Writings of Charles S. Peirce: A chronological edition* (Vol. 2, pp. 242-273). Bloomington, IN: Indiana University Press.
- Piaget, J. (1970a). *Genetic epistemology* (E. Duckworth, Trans.). New York: Columbia University Press.
- President's Council of Advisors on Science and Technology (2008). *University-private sector Research Partnerships in the Innovation Ecosystem*. Executive Office of the President. Washington DC.
- Rawls, J. (1996). *Political liberalism*. New York: Columbia University Press.
- Ross, S. N. (2008). Using developmental theory: When not to play telephone games. *Integral Review*, 4(1),31-46.
- Stein, Z. (2008). Myth busting and metric making: Refashioning the discourse about development. Excursus for Integral Leadership Review. *Integral Leadership Review*, 8(5).
- Stein, Z., Dawson, T.L., Fischer, K.W. (in press) Redesigning testing: operationalizing the new science of learning. In Khine & Saleh (Eds.) *The new science of learning: computers, cognition, and collaboration education*. Forthcoming from Springer Press.
- Stein, Z., della Chiesa, B. Hinton, C., Fischer, K.W. (forthcoming, 2010). Ethical issues in Educational Neuroscience: Raising Children in a Brave New World. In *Oxford Handbook of Neuroethics*. (Illes & Sahakian, Eds.) Oxford University Press.
- Stein, Z. & Hiekkinen, K. (2009). Metrics, models, and measurement in developmental psychology. *Integral Review*, 5(1), 4-24.
- Sullivan, H. S. (1964). *The collected works of Harry Stack Sullivan* (Vol. 1 and 2). New York: W.W. Norton & Company.
- Taylor, C. (1989). *Sources of the self*. Cambridge, MA: Harvard University Press.
- Tipler, F.J. (2004). Refereed Journals: Do they insure quality or enforce orthodoxy? In Dembski (Ed.), *Uncommon dissent: intellectuals who find Darwinism unconvincing*. Wilmington, DE: ISI books.
- Wilber, K. (1995). *Sex, ecology, spirituality - the spirit of evolution*. Boston: Shambhala Publications.

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It's an Empirical Question: On Cognition and Ego

Katie Heikkinen

In light of the wonderful rejoinders to the paper by Zachary Stein and myself, I offer a few informal (and rather rushed) comments in response, focusing on three elements: 1) the dangers of labeling colleagues; 2) psychometrics; and 3) the relationship between cognition and ego. In the second half of my paper, I describe my current research project, which I believe will be of interest to many of you.

On Labeling Colleagues

One point made by Stein in his paper (this volume) is of such great importance that I wish to restate it here: “disqualifying” certain arguments as coming from a lower developmental position is both illogical—because this stance uses the “truth” of a theory to negate critiques of that supposed truth—and unethical—because this stance devalues and marginalizes voices of opposition. But I’d like to extend his point to note that while “developmental disqualification” is a rather egregious sin, using developmental theory to label colleagues, even if in good fun, is nearly as egregious.

For example, Stewart, Smith, and Suzuki (this volume) quip that “we can all acknowledge a strong ‘T/Achiever/Orange’ streak” in some but not all of our colleagues. Since everyone he mentioned are making psychometrics for the marketplace and, I presume, care deeply about human development, I struggle to see the grounds for distinction here. We are all in the same boat! It seems to me that the distinction hinges on some rather messy confluences of structure and content. Various values such as interest in science or desire to self-promote (the content) can be held at multiple levels of complexity (the structure). This is an important distinction that Stein and I have made elsewhere (2008).

Without clear referencing to adequate data—and I think referencing particular value content is neither adequate nor clear—these labels are meaningless. They only serve to antagonize and threaten. Is this the kind of community we want?

On Psychometrics

Stein and I made a bold claim that the LAS and HCSS are the only calibrated metrics (2009). I am extremely grateful to Torbert and Livne-Taranadach (this volume) for their detailed description of the reliability testing of the LDP; to Stewart, Smith, and Suzuki (this volume) for their call for greater inclusion of the practitioner’s perspective; and to Basseches (this volume) for highlighting the importance of philosophical argument in determining the desirability of certain developmental outcomes. However none of these speak directly to the issue of calibration. While evidence of blind interrater reliability studies goes part of the way, it is not sufficient evidence of reliability to satisfy the requirements for individual assessment, which demand that statistical reliability is high enough to allow us to have a certain level of confidence



in each possible score (See Dawson's table, this volume). Both Torbert and Cook Greuter argue that they have scored hundreds, if not thousands of SCT's. Submitting their data to a Rasch analysis to examine the statistical reliability of their scales would be a simple matter.

Finally, I wish to point out a few questions that remain open after our publication and its rejoinders. Has anyone further evidence of validity or reliability studies of the Spiral Dynamics metrics? What are the implications of Jane Loevinger having said the test was not to be used to measure individuals (Loevinger, 1979; 1993)? What is the "right relationship" between first, second, and third person approaches (Torbert and Associates, 2004) in the field of psychometrics?

On Cognition and Ego

In this issue, Murray wonders whether "the structural transformations happening inside the body (or body/mind/soul) happen according to a different type of mathematics or logic or geometry" than the logic of hierarchical complexity (p. 344). This is a very reasonable musing that I myself, and many of my students at John F. Kennedy University, have made. I agree with his observation that change in such domains as compassion or inner peace *feel* very different than change in understanding, say, physical science concepts.

However, thus far we have no evidence of this alternative logic. To unfold may in fact *mean* to unfold through hierarchical complexity. Note that I do *not* mean that hierarchical complexity is the only important or real dimension of human change. To the contrary—there are many, many human change trajectories—some healthy and adaptive, others less so. But to conflate change—even the healthiest, most adaptive changes of them all—with development is problematic (e.g. Mascolo and Fischer, in press). As Stein and I have pointed out elsewhere (2008), linking a notion of development with particular content—such as Murray's examples of attributes that characterize wisdom, from "letting go" to a "sensation of expansion" to comfort with "dissonance, uncertainty, ambiguity, and paradox" (p. 344)—makes it impossible to see high forms of development that are not characterized by that content. Surely there must be someone who is highly developed—a complex thinker skillfully adapted to his world—who does not feel expansive?

Ah-ha, I can hear you thinking. *But, Katie*, that means *that person is not developed*. Yes, but only if you define "development" as "expansiveness." But as Stein (this volume) notes, to do so is to make a normative move. Implicit in that distinction is something like "I believe that it is better to be expansive than non-expansive." This may very well be true! But then we must 1) be honest that we are making evaluative claims; 2) be able to explain clearly why we view such changes as developmental—without making recourse to explanations inherent to the claim being made (e.g. "it is higher because it is higher"). For example, one might argue that expansiveness is developmental simply because the progression is hierarchical. That is, the end state of "expansiveness" hierarchically integrates lower order tasks (even if by exclusion): expansive pre-contraction (e.g. $A = \{e\}$), expansive with contraction (e.g. $A = \{e, c\}$), and expansive post-contraction (e.g. $A = \{e, \text{not } c\}$).

This is fine—a reasonable definition of development that does not define itself by itself (instead it calls on structural distinctions). But how could we *measure* such a concept? I'll exclude for now methods like clinical observation, simply because the Stein and Heikkinen paper focused on more formal metrics—so we are left with something like self-report. For example, we could ask people to explain their emotional and embodied states in an open-ended interview. If we then scored these interviews using the LAS, we could find one of several trends: 1) The feeling of “expansiveness” is one that is *only* reported at higher Lactical levels; 2) The feeling of “expansiveness” is one that is reported at many developmental levels; 3) That some people reasoning at high Lactical levels don't mention expansiveness at all.

Each of these findings has different implications. #1 suggests that expansiveness as a feeling-state is only experienced or spoken about when people have developed a complex capacity to discuss their states overall. Thus it could be said that “expansiveness” is one of the characteristics common to highly complex performance of emotional state understanding. #2 suggests the opposite; that expansiveness is a feeling state available to people operating at many levels of complexity. So the concept doesn't characterize a particular level; instead, we can track whether and how the concept changes with development. What does a simple understanding of “expansiveness” look like, compared to a more complex understanding? #3 is an almost certain finding, whether #1 or #2 prove true. It is rare for *every* sample at a given complexity level to contain the same concept. So some people who reason about their feeling states in a highly complex—highly developed—way do not talk about a sense of expansiveness. We might argue that this person is less healthy or behaves less adaptively, but in this view, we cannot say they are less developed.

Another option might be to score these self-reports with a newly developed scoring system, based on the surface structure of the performances. However, if this new system were anything like Kohlberg's, Armon's, or Perry's, the LAS would serve just as well (e.g., comparison with Kohlberg: Dawson, 2003; comparison with Armon: Dawson, 2002, Dawson-Tunik, 2004; comparison with Perry: Dawson, 2004).

Some of you may still wish to argue that expansiveness is not necessarily coupled in this way to the capacity to reason about it linguistically—that regardless of self-report, “I know it when I see it” or “I know it when I feel it.” This is reasonable. (First of all, I must make the caveat that “hierarchically complex” at least in terms of the LAS does not mean “complicated.” It means highly differentiated and *integrated*. So the LAS does not miss the “simplicity on the other side of complexity,” as some might claim.) But, again, how can we *measure* that ineffable state of being? We might use clinical assessments based on a set of criteria. A fine approach, but since it weighs on the expertise of the clinician, this approach is less scalable. We might instead develop a trait-inventory similar to a personality test. Fine again, but that is not developmental. At the simplest level, we can watch people and feel into them to determine how expansive they are. However, without psychometric procedures, this allows us to say nothing about the reliability or validity of such a judgment, or whether the capacity develops.

Note that in the end, even if we believe that the capacity to be or feel expansive is not tied to the capacity to reason about it linguistically, that it is somehow different and unfolds differently, we are still left with scant options other than linguistic self-report—if we wish to make strong

claims about it being a reliable, valid, and developmental psychological construct. But if we do not wish to make such claims, clinical assessments, trait inventories, or informal “grokking” all have their place. In this light we might think of “expansiveness” as something akin to “kindness:” a valued character trait where most people “know it when they see it” but that has no psychometric or developmental properties. This doesn’t lessen the importance of kindness—norms matter deeply, but they should not be part of developmental metrics.

What the LAS has attempted to do is strip the normativity away from the assessment process. Stein (this volume) notes that such notables as Baldwin, Piaget, Kohlberg and Sullivan “used prescriptive, normative, or ethical language, [but] they did not draw it directly from the empirical substance of their models” (p. 15). This point is worth repeating—*they turned to philosophers*. I don’t think that this implies that psychologists have nothing to say about the normative aspects of human development. Some psychological findings—such as those linking various behaviors to happiness or mental health—do offer insight into how humans might attain certain desirable outcomes. But determining whether those desired outcomes *ought to be desired* is not the job of the psychologist—unless they are clear that they are “putting on their philosopher hat” in so doing.

I hope I’ve highlighted some of the challenges in determining whether “the structural transformations happening inside the body (or body/mind/soul) happen according to a different type of mathematics or logic or geometry” than the logic of hierarchical complexity (Murray, this volume, p. 344). Perhaps it’s true! But the science of measurement, it seems, struggles to make this distinction. Whether this is a current struggle—reconcilable with changes in methods—or an intractable struggle—because these aspects can only be known through linguistic performance—remains to be seen.

My Current Research Project

In this issue, Murray wonders whether “ego development” metrics such as those from the Loevinger tradition are “assessing some of the wisdom skills that [he] argue[s] may have elements that do not develop according to hierarchical logics” (p. 345). Musings about the relationship between ego development and hierarchical complexity are a start, but this is fundamentally an empirical question. One way to address this question is to re-score ego development data using a structural method (the LAS or the MHC). However, this is hard to do with SCTs because the stems are so short. Short sentences can be scored by the LAS, but without any justification by the participant, less confidence is placed in the scores. However, another such “ego development” model is Robert Kegan’s constructive developmental theory (1982; 1994), which features a validity profile similar to the current versions of the SCT (e.g. Torbert et al, this volume) in that it focuses on external or predictive validity (e.g. Kegan, 1994; Harris and Kuhnert, 2008; Lewis et al., 2005). I am currently working on a research project to address just this empirical question. I’d like to share my thinking with you here, in hopes that it sheds more light on some of the important distinctions Stein and I have made in previous publications (2008; 2009): content versus structure and metric versus model.

Kegan’s constructive-developmental model details how a person’s meaning-making structure undergoes qualitative shifts over the lifespan. This model includes five stages of change in an

individual's "order of mind," which is an overarching structure of self-system organization. An "order of mind" includes cognition as well as intrapersonal and interpersonal abilities, all of which are hypothesized to change in concert with one another. Individuals are located on the stage spectrum by participating in a "subject object interview" (or SOI) where they discuss events that are emotionally significant to them. These interviews are transcribed and then scored using an inductive process that is supported with examples. The scoring process also depends on the skill of the interviewers, since they develop and test stage hypotheses during the interview itself (Lahey, Souvaine, Kegan, Goodman, and Felix, 1988).

Relying on an inductive process—where scorers infer underlying structure of meaning making—has important advantages over scoring methods that rely more heavily on concept-matching strategies, such as Kohlberg's (Colby and Kohlberg, 1987). Concept matching strategies "suffer from bias introduced by nonrepresentative construction samples and an overdependence on particular content" (Dawson, 2003, p. 337). Inferring underlying structure allows raters to "look through" disparate-seeming surface content to see similar structures that lie beneath (or vice versa). However, I argue here that the SOI, like the Standard Issue Scoring System, can only claim to "peer beneath" one layer of *structure*—the conceptual *content*—to view the surface (or domain) structure of a performance (Stein and Heikkinen, 2008). This places it in fine company—this is true of nearly all extant developmental metrics.

In contrast, the Hierarchical Complexity Scoring System and the Lectical Assessment System claim to be able to peer beneath *both* conceptual content and domain structure to discern the core structure that lies beneath. In recent years, research by Dawson and colleagues has shown that interview data collected for analysis with various domain-specific scoring systems can be scored with the domain-general Lectical Assessment System (or its precursor the HCSS), yielding results that suggest that all of these systems measure the same underlying developmental dimension, hierarchical complexity (e.g., comparison with Kohlberg: Dawson, 2003; comparison with Armon: Dawson, 2002, Dawson-Tunik, 2004; comparison with Perry: Dawson, 2004; see also Kitchener and Fischer, 1990 on reflective judgment). Dawson's research suggests that this single dimension is indicative of development in *any* domain about which we can reason.

This claim has important implications for the measurement of development, including for systems like the SOI that claim to assess "whole people." Might metrics of ego development less directly measure the same latent dimension? A handy, though limited, analogy is the importance of controlling for socioeconomic status (SES) in multiple regression studies. Since we know SES impacts so many educational outcomes, we could not trust our results if we did not statistically control for SES. Similarly, since hierarchical complexity is likely a latent dimension of *all* verbal performances, we must assess it separately in order to tease apart its contribution to the performance from the contribution of other factors.

By separately assessing hierarchical complexity, we are able to ask other important questions of the data. Just as controlling for SES allows the impact of other variables of interest to be seen, "controlling for" hierarchical complexity allows us to independently analyze conceptual change in the domain. We can see more clearly which aspects of the performance are related to an increase in hierarchical complexity and which aspects are not. The latter are referred to as "horizontal" differences (Dawson, 1998)—attitudes, dispositions, preferences, factual

knowledge, and biases that vary at least somewhat independently from “vertical” complexity. Parsing out these two dimensions allows us to take a closer look at individual difference. We are also able to examine which concepts arise at what Lactical level (because concepts per-se are not tied to a specific level) and trace how concepts that arise early and persist change with development. Tracing a concept through Lactical levels produces a developmental sequence or set of learning pathways that is open to continual refinement (Dawson-Tunik, 2004; Dawson and Stein, 2008).

By scoring the SOI transcripts using the LAS, I will be able to discern how much of the variance in SOI scores is explained by hierarchical complexity. Note, however, that the claim is *not* that hierarchical complexity can explain all the important dimensions of human development. On the contrary, Dawson stresses that hierarchical complexity is *only one* dimension by which to evaluate performances. Her methodology of “developmental maieutics” calls for the close partnership of scoring experts (Lactical analysts) with content experts (experts in the domain being assessed) to ensure that that the full richness of the domain is included (Dawson and Stein, 2008). However, the analysis of domain specific content is a separate process, distinct from the process of scoring. Only after both scoring and content analyses have been completed are the scores and themes re-married to produce rich descriptions of conceptual development—the developmental sequences.

My study will reveal whether interviews like the SOI where people talk about their emotional reactions to important events in their lives provide good “fodder” for the LAS. If the LAS scores and the SOI scores are in agreement, or if the LAS explains a large portion of the variance in scores, it suggests that the SOI coding system, like those of Kohlberg, Armon, and Kitchener and King, taps the hierarchical complexity dimension. This may be due to a property of the scoring method itself—the SOI manual may actually take hierarchical complexity into account in its process, despite calling it by another name. Or, it may be a completely implicit effect—more hierarchically complex samples simple “feel” higher, regardless of the explicit scoring instructions.

This finding would raise questions about the need for a distinct scoring system for ego development (Theo Dawson, personal communication, 11/14/09). The SOI method of scoring would be redundant if it did not add any additional information over and above hierarchical complexity. This does not mean that self-object theory itself would necessarily be brought into question. In fact, results of this kind would serve as an external validation of the current sequence. But using the LAS to score SOI performances would allow researchers to continue to address, in a rigorous manner, the empirical question of how the content of performances on the SOI change with development. As I’ve mentioned earlier, separately analyzing hierarchical complexity and conceptual content allows us to create learning sequences that carefully track the evolution of a concept or skill. These learning sequences themselves are free to change as the research base accumulates or as the culture changes and how concepts are used is altered. In other words, the scale stays the same even as what we know about development in that domain changes. In addition, clarity around what elements of performances are vertical and which are horizontal allow for the horizontal dimensions to be studied with other methods, like the thematic coding in the present study—or myriad possibilities like surveys or scales. Finally,

using the same scoring method and scale in multiple domains allows us to make meaningful comparisons across domains, which is not possible when each system's score stands alone.

An important distinction to remind the reader of here is between *model* and *metric* (Stein and Heikkinen, 2009). Both models and metrics in developmental psychology are *representational devices*: “methods, symbol systems, and propositions—built by communities of developmental psychologists—which in some way claim to be *about* cognitive developmental processes” (p. 7). Metrics attempt to assess how much of a psychological trait is present, while models attempt to explain its presence and describe its origin. The LAS and the SOI are metrics; skill theory and constructive developmental theory are models. While models are necessarily linked to their respective metrics, they are not the same. In the present study, the implications impinge on the SOI metric, not the CD model. The subject-object shift may be an important causal mechanism in how development occurs—but hierarchical complexity measures this shift just as well, or as Dawson has argued, even better.

My study will also reveal the role of hierarchical complexity in how people talk about important events in their lives. Complex thinking may play little role in the interview as a whole—complex language is simply not needed to tell a good story about an important event. But the little moments where people show evidence of their more complex ways of thinking may say a lot. These “moments of complexity” may provide insight into how the performance as a whole hangs together; and indeed shed light on their “meaning making structure” by explicating how they perceive interconnections and links between various elements of their story. The learning sequences in particular might reveal how the concept of (for example) “taking responsibility for my own emotions” changes across development—from a “hollow concept” that is stated but not explained to a more rich and nuanced description of what such responsibility means and what forms it should take. These sequences may, in the end, echo Kegan's writings, but they will be arrived at via a different method. This may provide additional support for certain aspects of the constructive-developmental model.

If the LAS cannot be used to score these data, there are several possible explanations. It could be a simple “mechanical failure”—the present data may lack certain properties that are required for scoring with the LAS (such as sufficient evidence of reasoning and adequate length of reasoning performances). But if there is enough material present to assign a firm complexity score, and the scores provide a different ordering of the passages than did the original rater, the implications are quite intriguing. The SOI may be looking for a property that does not vary with hierarchical complexity, but is on its own, independent developmental trajectory. Or, particularly at the higher levels of ego development, a new simplicity may be attained that hierarchical complexity fails to see. These are all questions Murray poses, but this kind of empirical approach has the potential to answer them.

Overall, my intention is to improve measurement in developmental science and to better bridge the gulf between ego and cognitive development theories. I think that understanding stage development in adulthood is important and useful and I encourage wide-ranging use of developmental thinking. But I also wish to see the *science* of developmental stages advance, and this involves building bridges between different measures and metrics. The LAS has the unique potential to be a domain-general *ruler* of any development that is expressed through language

broadly construed. Although other systems may tap into important aspects of development in their own right, only by accounting for hierarchical complexity can we make meaningful comparisons across systems and thus advance our understanding of development in multiple domains.

I am excited about this project and welcome any feedback or further inquiries.

References

- Colby, A., & Kohlberg, L. (1987). *The measurement of moral judgment, vol. 2: Standard issue scoring manual*. New York: Cambridge University Press.
- Colby, A., & Kohlberg, L. (1987). *The measurement of moral judgment, vol. 1: Theoretical foundations and research validation*. New York: Cambridge University Press.
- Dawson, T. L. (1998). "A good education is ... "A life-span investigation of developmental and conceptual features of evaluative reasoning about education. Unpublished doctoral dissertation, University of California at Berkeley, Berkeley, CA.
- Dawson, T.L. (2002). A comparison of three developmental stage scoring systems. *Journal of Applied Measurement, 3*(2), 146-189.
- Dawson, T.L. (2003). A stage is a stage is a stage: A direct comparison of two scoring systems. *Journal of Genetic Psychology, 164*(3), 335-364.
- Dawson, T.L. (2004). Assessing intellectual development: Three approaches, one sequence. *Journal of Adult Development, 11*(2), 71-85.
- Dawson, T.L. & Stein, Z. (2008). Cycles of research and application in education: Learning pathways for energy concepts. *Mind, Brain, and Education, 2*(2), 90-103.
- Dawson-Tunik, T.L. (2004). "A good education is....:" The development of evaluative thought across the life span. *Genetic, Social, and General Psychology Monographs, 130*(1), 4-112.
- Harris, L.S. and Kuhnert, K.W. (2008). Looking through the lens of leadership: A constructive development approach. *Leadership and Organization Development Journal, 29*(1), 47-67.
- Kegan, R. (1982). *The evolving self: Problem and process in human development*. Cambridge, MA: Harvard University Press.
- Kegan, R. (1994). *In over our heads: The mental demands of modern life*. Cambridge, MA: Harvard University Press.
- Kitchener, K.S. and Fischer, K.W. (1990). A skill approach to the development of reflective thinking. Developmental perspectives on teaching and learning thinking skills. In D. Kuhn, (Ed). *Developmental perspectives on teaching and learning thinking skills. Contributions to human development*, Vol. 21. (pp. 48-62). Basel, Switzerland: Karger.
- Lahey, L., Souvaine, E., Kegan, R., Goodman, R., & Felix, S. (1988). *A guide to the Subject-Object Interview: Its administration and interpretation*. Cambridge, MA: Harvard Graduate School of Education, Subject-Object Research Group.
- Lewis, P., Forsythe, G.B., Sweeney, P., Bartone, P., Bullis, C., Snook, S. (2005). Identity development during the college years: Findings from the West Point Longitudinal Study. *Journal of College Student Development, 46*(4), 357-373.
- Loevinger, J. (1979). Construct validity of the sentence completion test of ego development. *Applied Psychological Measurement, 3*(3), 281-311.
- Loevinger, J. (1993). Ego development: Questions of method and theory. *Psychological Inquiry, 4*(1), 56-63.

- Mascolo, M.F. and Fischer, K.W. (in press). The dynamic development of thinking, feeling and acting over the lifespan. In W. F. Overton (Ed.), *Biology, cognition and methods across the life-span. Volume 1 of the Handbook of life-span development*, Editor-in-chief: R. M. Lerner. Hoboken, NJ: Wiley.
- Stein, Z., & Heikkinen, K. (2008). On operationalizing aspects of altitude: An introduction to the Lectual™ Assessment System for integral researchers. *Journal of integral theory and practice*, 3(1), 105-138.
- Stein, Z., & Heikkinen, K. (2009). Models, metrics, and measurement in developmental psychology. *Integral Review*, (5)1, 4-24.

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