

The Generality of Adult Development Stages and Transformations: Comparing Meaning-making and Logical Reasoning

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Abstract: Human development theories differ in “context sensitivity,” covering those stressing development stages and those stressing continuously progressing changes. The former theories differ in whether, how and why the stages are regarded as being generalized across domains, i.e. their generality claims. Piaget’s developmental stage theory of logical complexity of children and adolescents fulfill “strong” such claims, including fixed stage sequentiality of increasing complexity levels and higher stage structures integrating earlier ones. His theory has inspired a number of adult development stage theories with varying generality claims. These provide suggestions of stages and stage transitions reaching beyond “pure” cognition, integrating more of e.g. emotional, value and moral dimensions. From a neo-Piagetian perspective, core generality aspects seem to concern on the one hand logical reasoning and on the other hand meaning-making. This raises questions of how these aspects are related to each other in terms of stage structures and transformations.

The aim of the article is to discern general features in adult development stage structures and transitions, in terms of logical reasoning and meaning making. This is carried out by a “thought experiment” interrelating two theories that differ in these respects but that are both based on Piaget’s theory, namely Robert Kegan’s constructive developmental Subject-Object Theory (SOT) and Michael Commons’s behaviouristic Model of Hierarchical Complexity (MHC). This comparing approach concerns the 3rd, 4th and 5th order of consciousness as well as transitions between these according to SOT, and order 9 to 12 and corresponding transitions according to MHC. The thought experiment indicates

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that the generality claims of both models can be argued for without one of them necessarily being subordinated to the other one. Both theories are interpreted as differing but partly overlapping structures of coherence, while also being involved in transformative thesis-antithesis-synthesis processes. The possible interrelatedness between logical reasoning and meaning making is considered and discussed, as well as the relevance of differing generality claims, and contrasting subjectivistic and objectivistic “scientific positions.” Finally, it is argued for the need of contextualizing adult development theory and research by relating it to postindustrial societal demands and challenges in terms of e.g. a “transform-actional” approach.”

Keywords: Adult development, contextualization, dualities, generality, stages, subject-object structures, dialectical transformations, self-other coordination, differentiation-integration, hierarchical complexity, cognition, affection, meaning-making, logical reasoning.

Introduction

Studying human development across the life span is a field that includes several lines of reasoning. Developmental theories, taken as a whole, provide a wide and multifaceted view representing different traditions such as psychoanalytic, behaviouristic, cognitive developmental, socio-cultural, ecological, and life span perspectives (see e.g. Berk, 2010, Robinson, 2013). The conceptions of development vary with respect to qualitative and quantitative focus, continuous or discontinuous directions, one or more courses of development and the influence of nature and nurture. Moreover, the theories focus on differing aspects of development such as cognitive, emotional, motivational, moral, wisdom and spirituality domains. Overriding development issues concern causal mechanisms as well as the interconnectedness between different developmental lines and between different developmental domains. Causal mechanisms focus more or less on internal or external conditions as necessary or sufficient prerequisites for development, which indicates the “context sensitivity” of the theories. A well known demarcation line is the “inside-out” causal direction associated with Piaget’s cognitive developmental theory (1982) and an “outside-in” causal direction associated with Vygotsky’s sociocultural theory (1962), regarding the internalization and development of knowledge of the child and the adolescent (see Marti, 1996). Distinctions have also been made between cognitive developmental and contextual models (Pintrich, 2002). Cognitive developmental models stress the influence of internal drives, e.g. the drives towards cognitive equilibration elaborated in Piaget’s thinking, which are regarded as at least sufficient conditions for change, while contextual models instead focus on external conditions challenging a person’s thinking.

Thus, this multifaceted picture appears to be scattered, covering not only various theories and methodological approaches, but also reflecting differing epistemological and paradigmatic “scientific positions.” One dividing line concerns a predominantly objectivistic paradigmatic position associated with the natural sciences and positivism, and a predominantly subjectivistic paradigmatic position more common in social sciences and the humanities (Cohen, Manion, & Morriison, 2000). The differences seem to concern at least three interwoven aspects of relevance for life span development, namely a) focusing on the study object from “inside” or “outside,” b) focusing on formal aspects or the content in development and c) using quantitative or qualitative data approaches. These three aspects can be seen as more or less interrelated depending on the

extent to which they are embedded in broader paradigms (see e.g. Bryman, 2004). However, generality features in human development bring to the fore at least two theoretical and paradigmatic issues: the causal mechanisms involved and the continuation-discontinuation character of the change process.

Issues regarding the kind and degree of continuation-discontinuation are related to how development is conceived, compared to changes in general. A common understanding seems to be that even though all development concerns changes, all changes are not regarded as development. The latter require some kind of systematic character and direction of the change process (Hagström, 2003). Additionally, further classifications require more precise conceptualizations and definitions of what constitutes development in terms of e.g. stages and transitions between them. Strong "organismic" conceptions of development state criteria such as universality, fixed sequentiality, irreversibility, qualitiveness and the notion of an end state (Baltes & Nesselroade, 1979). The variation in conceptions of development may also be described in terms of hard, soft and functional models (Kohlberg & Armon, 1984). Hard theories consider development as a process of universal sequences that emanate from a total reorganization of a latent cognitive frame of reference. Functional theories refer to every stage developing for the purpose of carrying out a new task or fulfilling a new function (Ericson, 1968). Soft theories focus on the development of different personality traits, education, and social background.

General features in human development tend to be related to hard theories and strong development criteria, the cognitive domain and logical reasoning. Piaget's stage theory of logical thinking fulfills strong development criteria of hard approaches, such as fixed stage sequentiality of increasing complexity levels, with higher stage structures integrating earlier ones. Neo-piagetian theory and research have suggested a number of stages and stage transitions over the life span, beyond strict logical reasoning or "pure" cognition, involving more of meaning dimensions. Their "hard-soft" position and context sensitivity vary and they focus on differing domains such as moral development (Kohlberg, 1969), postformal thought (Sinnott, 2003) and ideals of a life and good work (Armon 1984; 1993).

However, the generality claims also vary among "hard" stage approaches. This raises the questions of whether and why certain domains would be more general than others and in what respects that would be the case. The domains refer to the content of the stages. This, in turn, is associated, directly or indirectly, with their functions in relation to demands and challenges in life. Among neo-Piagetian "hard stage" theories, the Subject-Object Theory (SOT) (Kegan, 1982; 1994), which focuses on a person's meaning making, is associated with high generality claims, higher than e.g. among rather closely related approaches such as the moral development theory developed by Kohlberg and colleagues (Kohlberg, 1969). Advocates of the latter theory (Colby, Kegan et.al., 1987) have considered their approach as less general than the SOT, which they consider to be an extremely general approach. They argue that in SOT "...the structure... forms a single coherence system across all domains" and that "The differences between thinking in different domains result from the application of a single cognitive structure to different contents." (p. 8, opt. cit.) Since both these theories fulfill formal "strong" development criteria, the higher generality features concern other aspects.

To conclude, logical reasoning and meaning making appear to stand out as “domains” that raise especially high generality claims. Moreover, in both cases these claims seem to reach beyond the generality features associated with “hard stages” or strong development criteria. These criteria mainly appear to express “formal” features of the development process. If so, logical reasoning and meaning making can be assumed to constitute other generality features in the development process, related to e.g. their content and/or their functions. This brings to the fore questions regarding the possible interrelatedness of logical reasoning and meaning making. Are they to be regarded as general but mutually isolated lines of development, and, if so, in what respects can they be regarded as general? Are they subordinated to each other with respect to generality, and, if so, how and why would that be the case? Furthermore, are they interrelated, and, if so how and why would that be the case?

Among neo-Piagetian theories, inspired by Piaget but reaching beyond logical reasoning and adolescence, high generality claims have also been stressed by the Model of Hierarchical Complexity (MHC, Commons and colleagues). MHC represents a behaviouristic approach, taking Piaget’s cognitive-logical approach as a point of departure, but explicitly delimiting its focus to the axiomatically derived logical dimension. The meaning making process of the SOT approach also has Piaget’s cognitive-logical approach as a starting point, but integrates this aspect in a constructivist meaning making context. The MHC and SOT theories have taken diverging routes away from Piaget’s theory, which seemingly has made the theory’s logical aspect and its meaning aspect involved in logic, explicit. Therefore a systematic comparison of these two explicit conceptions of logical reasoning and meaning making in stage development, might be a plausible base for answering questions about their generality claims, such as those mentioned above. Moreover, this may also contribute to the elucidation of issues concerning the relations between stages and their transformations, as well as the “inside-out” and “outside-in” “causal directions” of the development process. An interlinking comparison of these two theories can be regarded as a base for further theoretical considerations about generality features in a developmental-transformational perspective.

Therefore, the *aim of the article* is to discern general features in adult development stage structures and transitions in terms of logical reasoning and meaning making by interrelating the MHC and SOT approaches in a systematic, comparing “thought experiment” which will be further described below. Both of these theoretical stage models describe people’s frames of reference in terms of sets of strategies for coping with the challenges of life as a whole, rather than focusing on or dealing with limited domains only. In order to achieve the aim, a departure in the basic roots of the two theories seems to be necessary, namely Piaget’s constructivist-developmental way of thinking. What did he mean by logic, how did he relate logic to meaning and what did he refer to as meaning?

A Departure in Piaget: “Psycho-logical” Constructivism

Piaget’s well-known theory of logical thinking includes four main developmental stages, namely the sensorimotor, preoperational, concrete operational and formal operational stage. When concrete operations take place, approximately between ages 6-10, the thinking increasingly reaches beyond the sensory, intuitive or “magical” level. The concrete operations enable making inferences, such as addition and multiplication, of classes but are restricted to

concrete objects. The last, formal operational stage has its onset approximately from age 11 and onwards. In its most developed form, this stage enables logical thinking such as performing deductive hypothesis testing and systematic variation of variables. This stage structure is, although not undisputed, well established and will not be elaborated in more detail here. However, Piaget's understanding of the developmental process seems to be less well known. He related the developmental process to people's active construction and reconstruction of their thinking. This, in turn, was understood as being driven by assimilation to a given cognitive structure and accommodation of that structure – to adapt it to new experiences that do not fit in the prevailing structure – in an equilibration process. Epistemologically this can be said to advocate "...a position that knowledge is neither innately preformed in the mind nor directly copied from the environment" which also implies that "...individuals...are active agents in their own learning and development" (Amsel & Smetana, 2001, pp. 3-4). Thus, the generality claim of Piaget's theory is not restricted to the structure of logical thinking. It also conceives such structures as being involved in an active and interactive process between the person and the environment. The latter position underlines the importance he attached to the social context and the socialization process in the development of logical thinking.

Critics of Piaget's theory argued that logic and cognition in his theory were conceived as developing in a "social vacuum" and that people's substantial development would end with the acquisition of formal operative thinking. However, he moved from an earlier "functionalist phase" stressing social-interactive aspects related to logical thinking, to a "structuralist phase" focusing more on the internal logical thinking structures and eventually took both aspects into account as mutually related (Lourenco & Machado, 1996, see also Garcia, 1991). Much of the criticism does not seem to have taken into account the dialectical, constructivistic and developmental character of his approach and that he basically focused on an operational, not an axiomatic, logic (Lourenco & Machado, 1996). Although it was not his main focus, his model of formal operations "...from the very beginning underlined the conception of knowledge as always involving organization, inference and meaning" (Lourenco & Machado, 1996, p. 157). In these terms, development was considered as a way to eliminate sources of equilibration and the construction of new balances at higher complexity levels. Equilibration was defined as maintaining constancy (order) in an external context of continuous changes. The reorganization of one structure to a qualitatively new one, towards more complex stages, is an expression of qualitative "leaps" (Piaget, 1978).

Piaget's focus on the development of logical reasoning in these respects, did not mean that he regarded it as separated from the affective aspect of development. These aspects were rather considered to be closely interwoven: "The two aspects, affective and cognitive, are at the same time inseparable and irreducible." (Piaget & Inhelder, 1969, p. 158) and joined in a "functional parallelism" without one of them determining the other (Piaget & Inhelder, 1969, pp- 347ff.). Emotions were regarded as important due to their involvement in conflicts, crises and reequilibrations. This in turn, he related to the formation of personality, which he viewed as "...dominated by the search for coherence and an organization of values that will prevent internal conflicts..." (Piaget & Inhelder, 1969, p. 158). Thus the search for coherence, including e.g. value conflicts, was seen as interwoven with logical reasoning in forming the self-regulation of the individual. The highest complexity level in his stage theory, full formal operational thinking, is characterized as the capacity to think about thoughts and to reverse relations between what is

real and what is possible. This, in turn, constitutes a base for building ideals as an adaptation to society but not in strict isolated sequential orders: “Obviously, this does not mean that formal structures are first organized by themselves and later applied as adaptive instruments where they prove individually or socially useful... logic is not isolated from life; it is no more than the expression of operational coordinations essential to action” (Inhelder & Piaget, 1958, p. 342). In the formal operational stage, the adolescent has the cognitive capacity to analyze his or her own thinking as well as construct theories, which makes it possible to “...furnish the cognitive and evaluative bases for the assumption of adult roles, without mentioning a life program and projects for change. They are vital in the assimilation of the values which delineate societies or social classes as entities in contrast to simple interindividual relations” (Piaget & Inhelder, 1969, p. 340).

Thus, Piaget conceived logical reasoning as being interwoven with the values guiding adolescents’ goals, when searching for coherence in terms of their adult roles and functions in society. Affective and personality development was considered to be integrated with intellectual and moral development, in a framework that has been characterized as his social theory: “Just as affect is an indissociable motivational element in intellectual development, socio-affective bonds (or their lack) motivate social and moral development” (De Vries, 1997, p. 4). Piaget himself stated that: “Each progress in logic is equivalent, in a non-dissociable way, to a progress in the socialization of thought” (Piaget, 1950/1995, p. 85) and that “...individual functions and collective functions require each other in the explanation of the conditions necessary for logical equilibrium” (Piaget, 1950/1995, p. 94). Thus affection, values and social processes were seen as interrelated. His focus on logic can be expressed as a “psycho-logic.” Piaget’s model reaches across and beyond different domains of thinking and was therefore hard to grasp for a number of colleagues in other knowledge domains. He e.g. “...used too much logic for psychologists and too much psychology for logicians” (Lourenco & Machado, 1996, p. 156). He was criticized for connecting different kinds of logic that did not seem to fit together and for violating norms of logic. However, his focus was not on pure logic: “...unlike logicians, Piaget was not interested in purely formal issues, or issues internal to logic, such as axiomatic foundations. He wanted to develop an operational logic, a logic of action, a logic that in some sense would be a “*tertium*” between psychology and axiomatic logic... a logic that would be a truly ‘psycho logic’” (Lourenco & Machado, 1996, p. 156; Piaget, 1953, pp. 23-26). This may explain his mixture of different kinds of logic.

During the last years of his life, Piaget substantially revised his model of logic (Piaget & Garcia, 1987). He thought he had taken too much account of “...Aristotelian truth-value tables and failed to solve the well-known paradoxes of material implication, that is, statements logically or formally correct but without meaning” (Lourenco & Machado, 1996, p. 157). He instead tried to develop an intentional logic with meaning implication understood as: “...an implication in which p implies q if and only if a meaning of q is incorporated in that of p and this meaning is transitive” (Lourenco & Machado, 1996, p. 157). Meaning implication and material implication were basically regarded as two types of inference, where only meaning implication implied necessity: “In those cases in which there is a necessary rather than a contingent relation between the antecedent and the consequent, an entailment of meaning implication exists” (Lourenco & Machado, 1996, p. 157). He moved towards an operational logic where e.g. formal operations are characterized in terms of an internal necessity, which differs from pre-operational thinking. This

necessary feature of formal thinking may be understood as not only organizing a person's thinking in a logical-mathematical sense, but also as a potential for testing and analysis of internal and external phenomena covering emotionally loaded value aspects. Piaget's increasing interest in taking the role of content and context into account and relate these aspects to logical reasoning apparently corresponds to an increasing interest in meaning in development. His "psycho-logic" constructivistic approach covers both logical reasoning and meaning making. However, the concept of meaning is multifaceted and not undisputed. Piaget did not, as far as we know, elaborate more extensively and systematically on how core aspects of meaning making are related to Ego development in terms of relating oneself to social contexts and the meaning constituting aspects of this. As mentioned, further clarifications of the generality claims of the logical reasoning and meaning making aspects derived from Piaget's thinking will be elucidated by comparing the SOT and MHC understanding of these aspects. Before this will be further elaborated through a "thought experiment," these theories will be briefly described starting with SOT.

The Subject-Object Theory (SOT)

Below the SOT will be briefly described in terms of stage structure and change dynamic.

Main Character and Stage Structure

Robert Kegan's Subject-Object Theory (SOT) was, as described, strongly influenced by Piaget's thinking, but also by other neo-Piagetian theories such as Kohlberg's moral stage theory (1981). However, he was also influenced by less cognitively and constructivistic oriented neo-Piagetian theories, such as Loevinger's (1976) inductively based model of development (Hy & Loevinger, 1996), as well as other lines of thinking, such as neo-Freudian psychodynamic object relational theory. His neo-Freudian influences also included the conception of an ego developing across functional life stages in relation to the social-cultural context, as elaborated by Erikson (1968). Thus, he came to conceive ego as an evolving self, interacting in a social-societal-cultural context and guided by a frame of reference that involved logical reasoning but that was integrated in a broader meaning making process. On the basis of interviews with 39 persons in therapy, he interpreted the meaning making of a person as being characterized by underlying and unspoken assumptions that people took for granted. These assumptions were regarded as presuppositions to and thereby constituting the very foundation of our meaning making.

The development of meaning making is here described in terms of balances and dynamics between a subject and an object at increasing complexity levels. This is one core characteristic of the theory. In the initial balanced phases of the stages, the ego is conceived as a subject embedded in its assumptions that are unconsciously taken for granted, assumptions, which are called Big assumptions (see e.g. Kegan & Lahey, 2009). These constitute the meaning making of the subject who the subject intuitively and unreflectedly "is." On the other hand, there are thoughts and other mental entities that the subject can reflect on, something that the subject "has" as objects of awareness. Thus, each stage can be seen as the consequence of a given subject-object balance, the structure of a given stage defining the current meaning making of the person in question. The transitions and transformations between the stages are conceived as a differentiation from a given balance towards integration in a new balance. Such new balances

“...further differentiate the self from its embeddedness in the world, in a qualitatively new way...,” and “thereby creating a more integrated relationship to the world” (Kegan, 1982, p. 294).

The SOT covers five stages of increasingly more complex subject-object balances. In the first *Impulsive stage* the subject “is” its perceptions, social perceptions and impulses and its objectified earlier subject, its prevalent object, is its movements and sensations. In the next *Imperial stage* the former subject has become the object for reflections and the subject now “is” its taken for granted conceptions of concrete elements and relations, as well as its enduring needs and preferences associated with e.g. its concept of taking a role which enables simple social reciprocity. These stages appearing from early childhood, are followed by three stages that have been found to cover the majority of adults in late modern societies (Kegan, 2003), namely the *Socialized mind* (the interpersonal stage), the *Self-authoring mind* (the institutional stage) and the *Self-transforming mind* (the interindividual stage).

The latter three stages, which are the ones that will be applied in the “thought experiment,” are briefly described in Table 1 below.

Table 1. The Subject-Object theory (SOT): Consciousness stage/order 3–5 (based on Kegan, 1994, 2003).

Stage/order	Subject	Object	Underlying structure
3. The Socialized mind	Interpersonal: Role consciousness Cognitive: Ideality; abstractions Intrapersonal: Self consciousness	Interpersonal: Role concept Cognitive: Actuality; concrete Intrapersonal: Self concept	Cross-categorical
4. The Self-authoring mind	Interpersonal: Multiple role consciousness Cognitive: Ideology; relations between abstractions Intrapersonal: Self regulation	Interpersonal: Role consciousness Cognitive: Ideality; abstractions Intrapersonal: Self consciousness	System
5. The Self-transforming mind	Interpersonal: Self-other interpretation Cognitive: Trans-ideological; relations between forms Intrapersonal: Interpenetration of selves	Interpersonal: Multiple role consciousness Cognitive: Ideology; relations between abstractions Intrapersonal: Self regulation	Trans-system

As can be seen in Table 1, the subject-object character of the three stages covers interpersonal, cognitive and intrapersonal aspects. According to Kegan (1994), the Socialized mind corresponds to Piaget's stage of early formal logical operations, the Self-authoring mind to Piaget's full formal logical operations, while the Self-transforming mind exceeds the highest of Piaget's stages. The "positions" of logical structures within the balanced phases of the stages and within the unbalanced phases of their transitions, will be further considered as a main issue in our "thought experiment." The Socialized mind is related to a smaller close group context, the Self-authoring mind to a broader societal-institutional context and the Self-transforming mind to a still broader symbolic ideological context. The "broadness" aspect reflects increasingly complex conceptions of how these contexts are organized and coordinated hierarchically.

The SOT Transitions

The concept of Big assumption presented in relation to the Immunity to Change (ITC), was developed as a way to overcome the emotionally or even identity threatening dilemmas related to stage transitions (Kegan & Lahey, 2009). Thus, the construction, deconstruction and reconstruction of Big assumptions in the process towards higher complexity, involve consciously experiencing things that question the subject's identity base. The transformation towards higher stages of meaning making has been found to be triggered by situations of optimal conflict in which the inadequacy and the limits of the current structure become evident to the transforming person.

Such conflicts in the transitions from the Socialized mind to the Self-authoring mind are those between defining oneself in the context of others' expectations, on the one hand, and an emerging orientation towards considering "what is it I want," on the other hand (Lahey, *et al.*, 1988). Tensions here are e.g. *between* "Feeling vulnerable to incorporation, fusing, loss of myself as own person (self anger)" *and* "Feeling selfish, heartless, cold, uncaring as a result of beginning to consider me first" (Kegan, 1982, p. 270). Conflicts in the transition from the Self-authoring to the Self-transforming mind are associated with the conflict expressed in: "What before was experienced as a competent exercise of one's psychological independence can come to be felt as a kind of troubling remoteness or isolation, interpersonally and internally" (Kegan, 1982, p. 116). Tensions here are e.g. *between* "Feeling vulnerable to crippling self-attack, to identifying with my performance, isolated in self-containment," *and* "Feeling weak, ineffective, out of control...feeling evil, decadent, loss of identity, boundary loss (self-loss)" (Kegan, 1982, p. 270).

The transitional steps between each of stages 2 to 5, describe the extent to which a structure has been made an object (Lahey, *et al.*, 1988). The interview procedure follows a tradition of the Piagetian semi-clinical interview, further developed by questions about the interviewed person's real life experience. This includes emotional, cognitive, as well as intrapersonal and interpersonal aspects of psychological organization. Such real life situations are elicited from a series of ten uniform probes that are explored to discern their underlying epistemology. This will be further elaborated in the "thought experiment."

The stage transitions are described as six qualitative transformations from one subject-object balance to another, which are designated as: X, X(Y), X/Y and Y/X, and Y (X), Y. Among these,

X and Y refer to a subject-object balance in complete equilibrium and the four positions between these two balanced orders are more or less in disequilibrium. The X/Y or Y/X positions refer to which structure is ruling (Y/X means Y is ruling). This process will be further described in the “thought experiment” below. Suffice to mention that the transformation from one subject-object in equilibrium, X, to the next higher consciousness order, Y, reflects an internalization process, embedding the former X structure as a subordinated structure in the emergent Y structure.

The Model of Hierarchical Complexity (MHC)

In the same way as SOT was presented above, MHC will be briefly described below in terms of stage structure and change dynamic.

Main Character and Stage Structure

Michael Commons’ MHC is, as mentioned, another approach to addressing the problem of the variety of different stage theories and of their respective manuals, although mainly for clarifying Kohlberg’s scoring procedure (Commons & Ross, 2008). Commons and colleagues proposed a solution to this in their general stage model (Commons & Richards, 1984), later renamed the general model of hierarchical complexity, and finally the Model of Hierarchical Complexity or MHC (Commons, 2008). The generality claims here focus on logical reasoning in a strict axiomatic-mathematical respect, which is regarded as the necessary base for other domain specific developmental lines. A manual was developed in accordance with this theory with the aim of being able to score reasoning or any form of conceptualized information regardless of the domain involved (Commons, Miller, Goodheart, & Danaher-Gilpin, 2005) – while also claiming to replace all other manuals in this area. In line with this, *decalage* is not regarded as a problem for the theory, but rather as a consequence of the fact that a person’s stage of performance typically varies between different domains.

As mentioned, this is a content-free and scale-free model or framework for scoring different stages of development, regardless of the domain and content (Mascolo, 2008). The hierarchical complexity is instead described in terms of the structure of the information being organized when a task is being solved. MHC can be said to be based on mathematical principles, e.g. how information is organized and information theory. The model defines 16 orders of hierarchical complexity. Order $n+1$ is defined by the successful and non-arbitrary coordination of two or more elements from order n , according to the theory’s axiom. The orders are thus derived analytically and regarded as objective and ideal forms. Tasks are defined for the respective orders, and the behavior carried out in the attempt to complete the task is referred to as the performance. A performance is either successful or not and the term stage refers to the successful completion of a task of that order. The theory also takes into consideration the amount of support, or help, that the person receives when completing the task.

These orders (and stages) include the development of additional stages of increasingly complex logical thinking, compared to Piaget’s stage model. Piaget’s first Sensorimotor stage corresponds to MHC orders 0–3, Piaget’s second Preoperational stage correspond to MHC orders 4–5 and Piaget’s Concrete operational stage corresponds to MHC orders 6–8. Here we will summarize some main features of the stage structures and their transformations, from the 9th

abstract order to the 11th systematic order of hierarchical complexity. These orders cover Piaget's early formal operational and full formal logical operations, while MHC's 12th to 14th order – metasystematic, paradigmatic and cross-paradigmatic – exceed Piaget's highest formal-operational stage.

Before the 9th abstract order the child is capable of e.g. logically carrying out full arithmetic as well as analyzing concrete objects, actions and situations, which enables an understanding of mass and length as quantities that are independent of how or by whom these are perceived. But everything that is stated or reflected on corresponds to something concrete in the exterior world.

In the 9th abstract order these concrete elements can be coordinated to form abstract variables that do not correspond to any single factor object in the exterior world. This enables generalizations and the conception of abstract categories such as stereotypes (e.g. immigrants, leaders), personality traits (e.g. unreliable, benevolent), quantifications (e.g. no one, always) or abstract variables such as x and y , beyond specific and concrete positions and points of time. Imperatives of what one should and should not do are typical; x and y can be used and be related to without corresponding to any single value.

In the 10th formal order two abstract variables, such as x and y can be coordinated, typically in cause-and-effect relationships of the form “if x then y .” These can be found in logical deductions, formulations of hypothetical simple physical laws and linear unidirectional and one-dimensional functions, or in the solving of equations with one unknown variable. Examples include statements such as “an increase in the amount of carbon dioxide in the atmosphere leads to global warming” or “higher GDP leads to greater happiness.”

In the 11th systematic order, at least two formal relationships need to be coordinated to create a coherent system, such as a feedback loop: “An increased level of carbon dioxide leads to global warming which leads to an even higher level of carbon dioxide...” Formal relationships can be understood in different contexts, such as different cultures, ideologies, legal systems, eco-systems and discourses. Multivariate systems, functions and matrices are constructed and equations with more than one variable can be solved.

In the 12th metasystematic order, metasystems can be created by coordinating more than one system. Systems, cultures or ideologies are seen as limited and coherent systems that can be compared or combined. Different cultures and value systems can be compared or be shown to interact. Phenomena such as sustainability are understood by coordinating the different aspects or dimensions of it, such as economic, ecological and social. The characterization of the logic from the 8th to the 12th order of MHC, as well as the transition steps, are shown in Figure 1 below.

As described, the orders of hierarchical complexity define the tasks that are to be completed. A task at a certain order consists of carrying out and coordinating sub-tasks at lower orders, which can be illustrated by means of a pyramid structure according to Figure 2, where task a at a higher order coordinates the two elements b and c from a lower order of hierarchical complexity. The elements b and c can be seen as subtasks that need to be successfully completed and coordinated in order to complete the overall task a successfully.

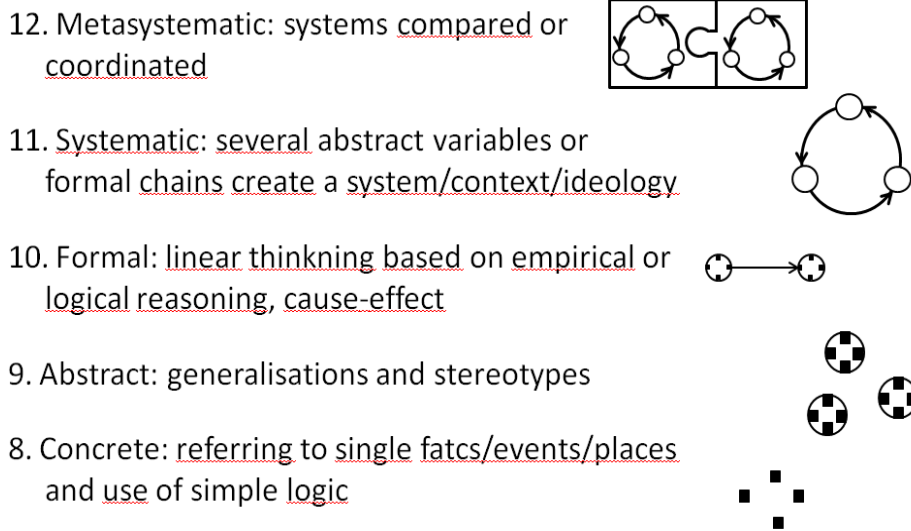


Figure 1. Description of order 8 to 12 in the Model of Hierarchical Complexity (MHC).

Order of hierarchical complexity

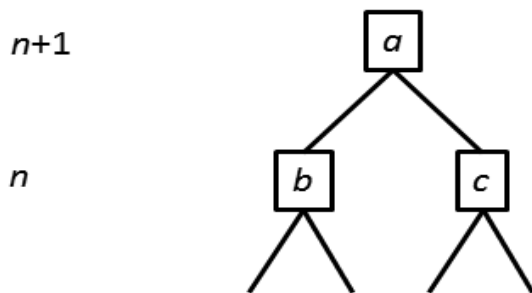


Figure 2. Illustration of a hierarchical structure having three elements, a at order $n+1$ that coordinates the sub-tasks b and c , which are elements of order n ; b and c in turn, coordinate lower-order elements.

The symbols a , b and c represent content, while the pyramid's form represents the relationship between them, the way they are organized, or the structure. This is the common way of representing a complex task in accordance with MHC (Commons, 2008). According to the axioms of MHC, that describe how conceptualized information of any sort becomes organized, an element or an object at a certain order has to coordinate at least two elements from the previous order in a non-arbitrary way, for a higher order of hierarchical complexity to emerge.

The MHC Transitions

As a part of the theory, the transitional steps between the different stages have been defined (Commons & Richards, 2002; Commons, 2008; Ross, 2008). These steps demonstrate the fractal nature of the progression, in terms of complexity, between two successive orders. The cycle is repeated again and again from one order to the next, following the pattern of thesis, antithesis, relativism, smash and finally a synthesis, which is the thesis of the next order. This process is illustrated in Table 2 below.

Table 2. MHC transitional steps.

1. Thesis	<i>a</i>	Thesis <i>a</i> at stage <i>n</i> . The thesis starts to deconstruct. It does not seem to solve the present task.
2. Antithesis	<i>b</i>	<i>a</i> is rejected and an antithesis <i>b</i> is formulated that appears to be the opposite of <i>a</i> .
3. Relativism	<i>a</i> or <i>b</i>	A state of ambivalence in which it is either <i>a</i> or <i>b</i> that seems to be correct, but one cannot decide which.
4-7. Smash	<i>a</i> and <i>b</i>	A synthesis begins to form in a chaotic, four-step process in which it is acknowledged that both <i>a</i> and <i>b</i> are needed.
8. Synthesis	<i>a</i> with <i>b</i>	Synthesis – a new equilibrium has been reached, a new thesis having been created by the successful coordination of the previous thesis <i>a</i> and antithesis <i>b</i> . The new synthesis defines the thesis at stage <i>n</i> +1.

Summarizing Conclusions: Similarities, Differences and Possible Interrelatedness

After this introduction of SOT and MHC, a systematic comparison between the logical reasoning and meaning making according these theories will be performed to shed some new light on the nature of the developmental process. This comparison takes a departure in the knowledge background presented so far, which delineates some main similarities and differences as well as possible interrelatedness between these developmental lines and their theoretical assumptions. As already described, these two theories as well as their inspirational base, Piaget's theory, appear to fulfill high "hard stage" generality claims, seemingly the highest in their research field. This builds the base for the aim of the article, starting in this common feature and consequently raises questions of the generality features besides these "formal" similarities. What is e.g. characterizing the generality of especially these developmental lines besides their "hard stage" feature? Are logical reasoning and meaning making subordinated each other in terms of generality and if so, how and why is that the case? Are they interrelated in the development process and if so, how could this process be understood?

Overriding differences may concern for instance the stressing of different parts of the dialectical movement of the developmental process. If development can be seen as interplay between the polarities of differentiation and integration, it could be said that the MHC axioms emphasize the integration aspect of development, while the differentiation is seen as a necessary part of the transition process. SOT tends to emphasize the differentiation part by describing conflicts and challenges threatening a given subject-object balance. A more obvious difference

between SOT and MHC is, as described, the different number of stages/orders proposed in these theories. SOT covers five orders of consciousness and MHC is currently being described with 16 orders of hierarchical complexity (0-15).

How may these differing conceptions of adult development be interrelated? They can be said to investigate different phenomena, and hence be referred to as different developmental lines. This difference has been referred to as the socio-emotional developmental line or dimension which together with epistemic position (King & Kitchener, 1994) constitutes the person's stance that "...determines who I think I am, thus what stance I take in dealing with the social as well as physical world" (Laske 2008, p. 99). Meanwhile, the cognitive development of logic is seen as a tool, although Laske proposes the description of a capacity to dialectical thinking instead of complex logical thinking, as described by MHC. According to Laske, this tool determines "what cognitive techniques and models I am able to use in construction and acting upon the world, as a result of holding a particular stance" (Laske 2008, p. 99). The two developmental dimensions are seen as separate but mutually linked in a dialectical relationship.

The embeddedness of logical reasoning in a meaning making context can be theoretically argued for following e.g. Piaget's way of reasoning which support the idea that these aspects of human coherence making are interrelated. At the same time the explicit delineating of these aspects in the two differing lines of development elaborated in the MHC and SOT theories provide arguments for regarding them as being distinctively different. We do neither exclude these interpretations per se, nor the conceiving of them as interrelated one way or another in the developmental process. The latter stand point rather appears as a reasonable presumption behind our comparing approach.

However, our approach is to examine "the logic in the meaning process" rather than examine "the meaning in the logic process." Performing the comparison the other way around could be argued for as a legitimate way to examine this interrelatedness conceiving logic in a wider perspective of coherence making or "comprehensibility" (Antonovsky, 1987) or by regarding logic reasoning as a "causal" necessary condition for the meaning making aspect to be manifested. However, our departure in the SOT process is motivated by our way of approaching meaning making and logical reasoning theoretically. This seems reasonable from a constructivistic perspective on the development and justified by their bases in Piaget's more integrative frame of reference and e.g. Laske's theoretical position (2008, p. 99) conceiving logic reasoning and meaning making as interrelated or interlinked. Both these aspects of coherence describe general aspects of people's coping with the challenges of life as a whole that reasonably can be assumed to have something in common.

However our taking the departure in the meaning making process and not in the logical reasoning process is also motivated by the compared theories' scientific positions. When the SOT and MHC developmental lines were differentiated in two contrasting directions from Piaget's theory, this made the starting point in SOT not only reasonable but almost necessary. The possible interrelatedness between the two aspects could hardly be discerned in a fruitful way by taking the departure in the restricted behaviouristic "outside" MHC perspective, but would reasonable be more worthwhile taking the departure from the inside constructivistic perspective of the SOT meaning making perspective. A consequence of this is that the logical reasoning

aspect is restricted somewhat on beforehand to be regarded as a kind of "tool" to judge for instance logically derived consequences of the self-other coordination in terms of their desirability. However, this does not exclude a possible interpretation that logical reasoning can for instance constitute necessary conditions for the SOT development to occur. The MHC development of logical reasoning is regarded as a process in its own respect that can be assumed to develop independently from the meaning making of SOT, although both processes still being assumed to be interlinked.

A Comparing "Thought Experiment"

Below a comparison is performed by systematically interlinking logical reasoning according to MHC to meaning making according to SOT. As outlined above, our way of approaching these questions takes a departure in the SOT meaning making process to examine how logical reasoning according to MHC might be related to three SOT stages, transitions and transformations. The comparison is restricted by certain assumptions. These are derived from the theories compared and some further theoretical articulations of them. On the base of these assumptions an examination in systematic steps will be performed elucidating in general terms how meaning making and logical reasoning may be progressively interrelated across three SOT stages.

The character of this examination seems to express some features associated with "thought experiments." This wide ranging concept includes many approaches (Stanford Encyclopedia of Philosophy, 2014). However, a common feature seems to be that they can be "...distinguished from e.g. counterfactual reasoning in general as they seem to require an experimental element, which seems to explain the impression that something is experienced" (Stanford Encyclopedia of Philosophy, 2014, p. 1). Thus it should be something experimental about them in this respect, for instance in terms of extreme implications of imagined scenarios in order to challenge or confirm theories or solve theoretical disputes. The "experimental" feature in our approach is, as described, about examine or testing theoretical implications by an interlinking comparison restricted by certain preconditions (the "experimental" element). Even if these preconditions might not constitute what we associate directly with "imaginary scenarios" they state assumptions about and beyond the compared theories and moreover how these can be examined. Thus, this approach seems to have a thought experimental character that distinguishes it from comparisons in a wider sense. Therefore it is entitled thought experiment. Conceived in such a way our approach cannot be claimed to generate "truths" or empirical evidence. The validity of the conclusions that can be made might concern the legitimacy of the assumptions made, the rationality of how to apply those assumptions and carry through the examination performed as well as what conclusions that can be drawn from it. Rational conclusions from this type of examination might in best case concern new theoretical perspectives or angles to be taking into account in the research field and new assumptions or hypotheses to be considered and tested.

The Piagetian Framework: A Departure

As already described, Kegan's description of "the Piagetian framework" guiding his own thinking includes three basic interwoven aspects (Kegan 1982, p. 294):

- A biological aspect, reflecting the essence of adaptation, the relating of organism to environment
- A psychological aspect, reflecting the essence of ego, the relating of self to others
- A philosophical aspect, reflecting the essence of truth, the relating of subject to object.

Taken together, these are conceived as different perspectives on the single process of meaning-constitutive development. The *biological aspect* concerns the evolutionary roots of human development as of an interactive character. This is forming basic preconditions for human thinking in terms of acting and interacting with environmental conditions, physical as well as social, in the struggle for survival. The *psychological aspect* concerns the psycho-social and identity base of the self as necessarily relating to others. This indissoluble relation has to be coordinated one way or another to solve for instance internal identity conflicts or master external demands. The *philosophical aspect* concerns the fundamental developmental character in terms of subject-object transformations as “coherence wholenesses.” As described, the stage structures are regarded as being transformed from being a non reflected subject, intuitively guiding a person’s actions and thinking, towards being reflected upon as an object.

The psychological aspect, the relating of self to others is regarded as reflecting the essence of ego, is taken as a central position in the thought experiment performed below. This is justified by the fact that SOT basically takes an inside theoretical perspective in terms of a person’s emotions, thoughts and action orientation in the developmental process. At the same time the relating of self to other(s) is imbedded in the adaptation process between man and environment that reflect a broader action-interaction perspective, including also the physical environment. Both the psychological self-other aspects and the adaptive man-environment aspects, in turn, involve the subject-object coordination as a philosophical-existential aspect of the process. Thus, the ego in the thought experiment concern people’s self-other coordinations hampering or promoting their subject-object transformations in the ego’s interaction with the environment. Thus, the aspect of self-relating to other in this Piagetian framework is conceived as not being limited to an isolated psychological-social dimension of development. Instead it is understood as being embedded in and reflecting a broader and deeper meaning constructing activity and movement of an acting and interacting ego.

This overriding frame of reference provides a departure for our theoretical way of approaching the SOT process in the “thought experiment.” As described, the SOT process is taken as a starting point for this “experiment” which is a kind of examination or test of how logic reasoning and meaning making is interlinked in this process. This testing examination is restricted by the following assumptions

Assumptions, Big Assumptions and General Stage Assumptions

The *first assumption*, or perhaps rather the way of framing the stage developmental lines compared is in terms of dialectical processes as being more or less dynamic movements between balanced (equilibrated) and imbalanced (disequilibrated) phases in this movement. This can be seen as a way to focus on both stages, structures, a taxonomy aspect and the underlying process, and an ontological aspect, in terms of the interplay between both these structure and process aspects in stage development (e.g. Kegan & Lahey, 1998). This dialectic feature of the

developmental process can be traced to Piaget's theory and seen as characterizing both the SOT and MHC developmental processes.

The *second assumption* is that the meaning making stage-wise process in SOT can be expressed in general assumptions regarding a person's perceived self-other relating and coordinating in each stage. Here we take a departure in the Immunity to change concept "Big assumption." As already mentioned, such assumptions are not conceived as we commonly understand the concept of assumptions, as consciously more or less articulated statements of what may characterize events and phenomena. Instead, Big assumptions refer to taken for granted truths like meaning regulating principles (Kegan & Lahey, 2001; Wagner, Kegan, *et al.*, 2006; Kegan & Lahey, 2009). Thus, these assumptions are by definition not consciously articulated. Although derived from SOT, our assumption involve a further step of articulating such meaning regulating and taken for granted assumptions in terms of assumed explicit self-other coordinations that we consider as typically characterizing each SOT stage from theoretical considerations. Here the "self-meaning context" is consequently formulated as a person's "action orientation," while the "other-meaning context" concern the collective contexts towards which these actions are oriented, both aspects on increasing stage complexity orders of meaning making. The meaning context includes the increasingly complex motivational drives and directed action structures involved in a person's action orientation. We refer to these self-other aspects as General Stage Assumption (GSA)

The *third assumption* is that such General Stage Assumptions of the self relating to others can be conceived as "dualities." This means that the "self-other poles" are regarded as necessary and mutual part of a process, rather than as a static contradiction of opposing positions (Sánchez-Runde & Pettigrew, 2003; see also Sun, 2002). In the Piagetian framework described, the relating of organism to environment, of self to others and subject to object can be seen as indivisible parts of wholenesses. Other examples are differentiation-integration and external-internal. None of the "duality poles" can be properly understood without the other, either as foreground or background. Combined with the first assumption this imply that the self-other meaning context duality is seen as involved in a dialectical movement. They can be characterized as initially being intuitively balanced in the subject's non-reflected position in the balanced phase in a new order of consciousness, but then being increasingly unbalanced and rebalanced when deconstructed and reconstructed in the transitions to higher orders.

The *fourth assumption* is that the self-other duality trigger the ego to master the imbalances between these two meaning contexts generated by e.g. internal conflicts and/or external challenges. The General Stage Assumptions involve both such internal conflicts and external challenges. These bring to the fore conflicts or dilemmas that concern how to take into account both the action orientation of the self-meaning context and the other-meaning context to be able to coordinate them (this being further clarified below). The GSA dilemmas in our examination are chosen to express typical such conflicts at each stage transition. One example is how to combine individual goals with societal demands in an at least partly individualistic way in the socialization process into societal life. This concern balancing e.g. the values and goals of the self meaning context with those of in the other meaning context. According to SOT this involves an internalization step transforming the former subject into a new object.

These four assumptions are supposed to promote:

- The specifying of the multifaceted concept of meaning making in stage development in terms of more precise General Stage Assumptions (GSA) of self-other meaning contexts being coordinated
- The discerning of these coordinations as "regulating principles" in the deconstruction and reconstruction of the GSA in the stages and their transformations
- The discerning of an ego conceived as an "active agent" coordinating these meaning contexts in balanced- –imbalanced – new balanced phases expressed as a dialectical movement towards higher orders of consciousness
- The discerning of how the MHC complexity orders are related to this self-other coordination as a) enabling the discerning of self other meaning context in increasingly abstract terms and b) providing a logical reasoning "tool" to considering consequences of acting according "the self meaning context" or acting according the "other meaning context" to master dilemmas and meet challenges in the deconstruction and reconstruction of the GSA.

The Assumed Developmental Process Character: Further Clarifications

The GSA suggested below is formulated in terms of a person's differentiation from an intuitive embeddedness in a certain collective context in the equilibrium orders and integration in a wider collective context by an internalization process in the transitions between these orders. As already described, this transition is formally expressed as totally six qualitative steps from one subject-object balance to another, designated as: X, X(Y), X/Y and Y/X, Y(X), Y (Lahey, *et al.*, 1988). Among these, X and Y refer to a subject-object balance in complete equilibrium. This process express a former balanced structure X being step-wisely deconstructed, the X(Y), and X/Y positions, and reconstructed, the Y/X and Y/X positions.

We consider this as a transitional balance shift between a "*differentiation sequence*" from the embeddedness at a lower order of complexity, with a smaller "self-context" (X(Y) and X/Y) to an "*integration sequence*" (Y/X and Y(X)) towards a higher order of complexity, with a larger "other-context." This can be expressed as the self-other balance "tipping over" from the X- "differentiation side" to the Y- "integration side." The stage transformation involves the internalization of the "other-position" as integrated in the "self-position" on a more complex order of consciousness. Internally, this is reflected by the self *internalizing* the "other-position" as consistent with the "position" of one's own. The notion of position here includes both cognitive and affective orientations, see below. Externally this reflects that the self can orient the new "self position" towards and within a broader and more complex context.

The "tipping over" concern a shift between two "outlooks" that will be formulated in the thought experiment as the GSA at a given stage is being deconstructed and then reconstructed. The coordination of the "outlooks" reflecting the self-part and other-part of the self-other dualism involves both cognitive and affective dilemmas. As described cognitive and affective aspects were conceived by Piaget as inseparably joined in a "functional parallelism" and a similar understanding of the interrelatedness has gained further support from different research fields, such as brain research, (Damasio, 1994; Cohen, 2005) and psychological experiments

regarding economic judgments (Kahneman, 2012). The cognitive aspect may concern increasingly articulated and complex goals of actions, such as interests, goals and strategies, related to the two outlooks. The affective aspect may concern increasingly complex motivational “drives,” such as needs, values, visions, of the same outlooks. Values, defined as frames of references in judging events in terms of desirability and guidelines for actions provide motives and motivation to act and orient a person’s action to social, cultural and societal contexts (e.g. Hagström, 2003; Reed, Turiel, & Brown, 1996). Needs and interests can be seen as less complex such motivational “drives” and action guidelines while visions and strategies express more complex such motivational drives and guidelines. Strategies can for instance compared to single goals be regarded as more overriding plans to fulfill a vision taking into account several steps and sub goals due to occurring events. A vision here concerns a desirable future situation, including e.g. values, affections, and special circumstances.

A way to systematically illustrate this is to conceive values as coordinating two or more needs and goals as coordinating two or more interests; and consequently visions as coordinating two or more values and strategies coordinating two or more goals. The transformations are assumed to involve an internalizing of for instance two or more contrasting values and goals in a higher order within the frame of one vision and one strategy. Values and goals are consequently considered as subordinated the visions and strategies hierarchically, which consequently reflects a lower SOT order of consciousness. This is illustrated in the figure below:

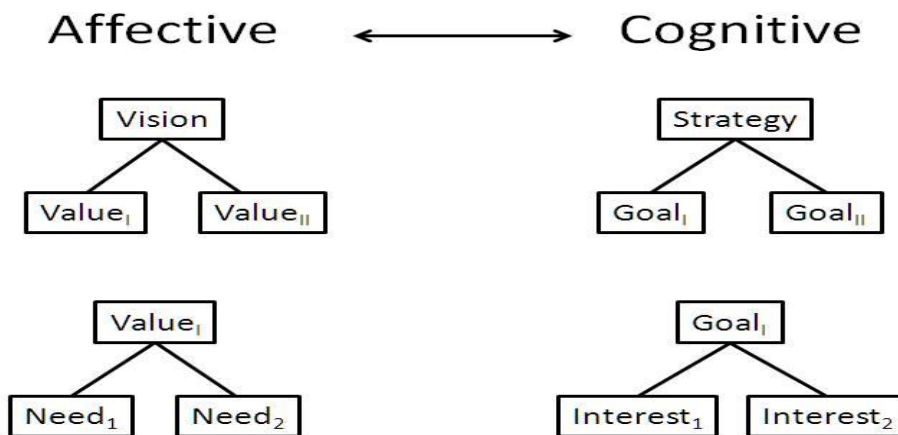


Figure 3. The affective and cognitive aspects of a person’s action orientation at different levels of complexity.

Furthermore these affective and cognitive aspects may be assumed being interwoven, possibly as both being more differentiated and integrated on increasing SOT orders as indicated by the arrows in Figure 3 pointing in both directions. Thus the meaning contexts in our examination concerns the increasingly larger and more complex or abstract collective contexts a person can discern and grasp and therefore being involved in by orienting his/her actions by increasingly complex motivational drives and directions of actions. This aspect of the coordination of the self-other meaning context express the ego as an “active agent” trying to reach desirable goals, acting and interacting in the surrounding world. As described, the dilemmas brought to the fore in this process is assumed to constitute general conflicts and challenges typical for each GSA that have

to be solved at each SOT transition. The reasoning “tool” in order to master such dilemmas and challenges concern logical reasoning on increasing MHC complexity orders, for instance in terms of formal order if-so causal sequences or in terms of systematic order feedback loops. This appears to express the operative aspect of logic according to Piaget. The logical reasoning involved focuses on desirable or undesirable consequences of acting according the action orientation of a person’s self-meaning context and other-meaning context.

Consequently, the coordination of the two outlooks is conceived as involving both these aspects as interwoven in people’s action orientation. However, these coordinations are assumed to reflect a relative balance shift between them rather than a total dislocation. Increasingly loosening roots in a smaller self-context is tipping over to more solid roots in a larger other-context. Furthermore, these shifts can be assumed to be initiated by meaning related conflicts within the self-meaning context as well as by meaning related challenges in the other-meaning context. Irrespective of how this process starts and progresses, these shifts are basically considered as expressing a deeper dilemma. It concerns the existential experience of a person not being firmly rooted in either a former self-meaning context or in a potential other-meaning context. This dilemma, regarded as reflecting the dualistic character of the self-other coordination, basically concern how to maintain the continuation of one’s identity.

This conception of developmental process can be understood as a shift of the self-other balances in the developmental process including at least three main phases, a) a balanced self-other “*initiating step*” in each new order of consciousness, b) an increasing-decreasing imbalance between the perceived self meaning context and the other meaning context in a “*transition step*” between the earlier self-position (X) and the later other-position (Y) and c) the generation of a “*transformation step*” internalizing the “other-position” as consistent with the position of one’s own. This process appear to express a dialectical interplay between the self-positions considered as the thesis’s and the “other-positions” as the antithesis’s resulting in synthesis’s in the transformation step.

The thesis-antithesis feature of the “self-other” positions is here considered as a consequence of their basically existential and identity threatening character as contrasts that have to be coordinated one way or another. Their dualistic “formal-dialectical” features seem to correspond with the MHC transition already described. The “relativistic” position after the thesis-antithesis positions in the MHC transition process is expressed as an either (thesis) or (antithesis) position, which seem to “formally-dialectically” correspond with the SOT transition step distinguishing the self-other dilemma as contrasting “either-or” positions. The SOT process of trying to coordinate these positions, initiating the transformation step may, in turn, share some characteristics with the “smash” step in the MHC transition. In both processes, thesis and antithesis are acknowledged as needed, followed by them being coordinated at a higher complexity order. However, in the thought experiment, the MHC development of logical reasoning is regarded as a process in its own respect that may develop relatively isolated from the SOT development process, although both processes are assumed to be interlinked.

As described, the thought experiment can be considered as a systematic way of comparing these two lines of development, assuming that they reasonably should be interrelated one way another. As also described, this presumption is justified by their basis in Piaget’s more

integrative frame of logic and meaning being interrelated. The assumption is further justified by the fact that they both describe people's frames of references and coherence in terms of coping with the challenges of life as a whole, which reasonably should involve both logic and meaning.

The Meaning Making in Three Orders of Meaning Making Related to Four Orders of Logical Reasoning

Thus, in order to discern how meaning making is related to logical reasoning, the General Stage Assumptions derived from SOT are judged in terms of MHC complexity orders in three of the SOT stages, the Socialized mind (3rd order), the Self-authoring mind (4th order) and the Self-transforming mind (5th order) and the transitions and transformations between these orders. The thought experiment is briefly performed stage-wisely in the following way:

1. The brief characterization of the subject and object according to SOT in each of the three stages.
2. Formulations of the “*initiating step*” in terms of the subject's General Stage Assumption stated as it's relating of self to other(s) as a non-reflected coordination of this self-other dualism at each stage.
3. Formulations of a “*transition step*” in terms of the self-other dualism being increasingly differentiated when being deconstructed due to a stage typical conflict and being increasingly integrated in a forthcoming “other-meaning” context as reconstructed by the self. Here, the MHC logical aspect is regarded as involved in two respects: First, to enabling the discerning and grasping of the meaning contexts involved in term of their “abstraction levels,” and second, as the complexity of the logical reasoning involved to realize consequences related to the contrasting meaning contexts in terms of their desirability.
4. This either-or balancing comparing process is assumed to generate the “*transformation step*” where the former self is being internalized into a new order balance, integrating the former self in a new self at a higher complexity SOT order.

This will be performed in three sections below, starting with the 3rd SOT and the 9th MHC order.

The 3rd Socialized Mind Order and its Transformation

The subject here concerns “the interpersonal mutuality” while the object concern “needs, interests and wishes” (Kegan, 1982). The subject is here initially embedded in “mutually reciprocal one-to one relationships” within a close group relationship(s) context, such as the family or peer group. The subject's intuitive coordination of the relating of self to others may be formulated in the following GSA, reflecting the X equilibrated stage 3rd order of consciousness:

Subject's intuitive frame: “I am my needs and interests of my close group meaning context.”

Latent “self-other” duality co-ordination: “I am the needs and interests coordinated with those within my close group meaning context.”

The subject's GSA in this balanced self-other "*initiating step*" constitutes what the subject unreflectedly "is." Thus the person's preferences, interests and wishes are perceived as mutually interwoven with those within this person's close group context. The MHC order that constitutes the "minimal" logical capacity to discern and grasp this group context as an abstract context with common features characterizing this context seem to be the No 9 abstract order of hierarchical complexity. As described, this order enables to a person to form abstract variables, such as x and y that don't correspond to single concrete factors or instances in the exterior world. Thus, as already described, variables can be formed out of finite classes that are based on abstract features in terms of quantitative classes (e.g. "always," "everyone") and stereotypes applied to people (e.g. "teacher," "immigrant") as well as imperatives of what one should and should not do. This enables the conceptions of group contexts as characterized by their common needs and interests as uniting their members.

Thus, the meaning constitutive coordination at this third SOT order of consciousness concerns the preferences and interests of the self-part and those of the other-part. Conditions starting the transition step by promoting the *deconstruction* and *reconstructing* of the self-other duality of this GSA may involve conflicts within the close group context as well as dilemmas derived from demands and challenges outside this context, such as conflicting interest between groups that the subject identifies with. The conflict that differentiates the self from its initial embeddedness might concern balancing being caring or selfish, such as feeling selfish when putting one's own preferences and interests before those of other persons' in this context. When experiencing and reflecting about such dilemmas, the self position in the duality can be discernible as a meaning context of one's own, reflecting the differentiation sequence described above. Since groups can be conceived as having something in common beyond their concrete appearance, the self is capable of discerning the possibility of joining other group meaning contexts in terms of possible better solutions of conflicting preferences and interests.

This can be assumed to initiate the integration in a broader social context, due to the self being increasingly capable of open itself the other meaning context. This side of the process concern the integration sequence, also described above. The GSA deconstruction reflected in "I am my own needs and interests *differentiated* from my close group meaning context" and the GSA reconstruction reflected in "I am my needs and interests integrated in a larger social meaning context" can be seen as expressing the different outlooks described above, which reflects the existential dilemma of leaving an identity base, here in the small group meaning context, without being firmly rooted in another identity base in other larger social meaning contexts.

The considerations and reflections when comparing these self-other meaning contexts reasonably involves "if-so" reasoning focusing the possible consequences of acting according preferences and interests in both contexts which therefore may be regarded as a necessary conditions for a further transformation to a higher SOT order to occur. Such way of reasoning does not appear to being possible to perform according the 9th abstract MHC complexity order of logical reasoning. Instead the 10th formal order of hierarchical complexity appears as necessary since it enables cause-effect thinking (if-so, if x then y). Reasoning in these lines reflects the linear process of achieving a goal, or rather with the self-image of already being at that goal. This constitutes for instance young people's cognitive as well as evaluative bases for the

assumption of adult roles, life projects and so forth, within a societal context. Thus, logical reasoning of this complexity order makes it possible to relate the preferences and interests of the self-other meaning contexts by logical if-so reasoning, making consequences of the two meaning contexts needs and interests being discernible.

Consequently, such order of reasoning can be assumed to constitute a necessary cognitive tool to consider more or less desirable consequences of both differentiating from a self meaning context and integrating in a new one. The considerations involved here might move the either-or dialectical contrasting transition step over to the transformation step generating a new higher order self, internalizing the former self's preferences and interests in the frame of own values and goals related to the socialization into a societal institutional meaning context. Thus, these values and goals integrate the former needs and interests as subordinated but integrated in the superior necessity to collaborate with others to reach common societal goals regarded as not necessarily conflicting with the small group meaning contexts. The former subject as a "small group self" has become an object being consciously coordinated in a new larger and more complex meaning context on the 4th SOT order.

The 4th Self-authoring Mind Order and its Transformation

The subject here concerns "authorship, identity, psychic administration and ideology" and the object "the interpersonal mutuality" (Kegan, 1982). The subject is initially embedded in an institutional-societal context. Its intuitive coordination of the relating of self to others may be formulated in the following GSA reflecting the X equilibrated stage 4th order of consciousness:

Subject's intuitive frame: "I am my values and goals of my institutional-societal meaning context."

Latent "self-other" duality co-ordination: "I am my values and goals coordinated with those of my institutional-societal meaning context."

The subject's GSA in this balanced self-other initiating step is assumed to constitute what the subject unreflectedly "is" in terms of its values and goals. The MHC complexity that appears to constitute the "minimal" capacity required to discern and grasp the "abstraction level" associated with an institutional-societal meaning context appear to be the 10th formal order. The self-context at this order can be understood as the goal oriented "system" acting and interacting within a non reflected collective-societal context. The self context has consequently been transformed to the "self-system" of an ego capable of moving beyond the close group context, subordinating affective needs and cognitive interests in the frame of own values, goals, actions and interactions. However, the former close group context is still perceived as remaining intact to return to. Joining broader social contexts is promoted by for instance going to college or to temporary jobs which provide "...opportunities for provisional identity which both leave the interpersonal context behind and preserve it, intact for return; a time limited participation in institutional life" (Kegan, 1982, p. 165).

The meaning constitutive coordination at this order of consciousness concerns the values and goals of the self-part and those of the other-part. The transition step is regarded as being

promoted by the deconstruction and reconstructing of the self-other regulating elements of this GSA, which here concerns conflicts within the societal-institutional meaning context, as well as challenges outside or beyond this societal-institutional context. The conflict that differentiates the self from its initial embeddedness might concern doubts about the self's identification with the common institutional societal norms and values as constituting the ideal or role as being a pillar of society. This could be clarified through the insight of there being a gap between reality and ideology, between the self and an ideal, or between the self and society. Experiencing such stage typical conflicts initiates the differentiation sequence part of the process. This is followed by the integration sequence where other possible collective meaning contexts are discerned as framing e.g. ideological action guidelines to reach better solutions of the typical conflicts at this order than those provided by the traditional societal-institutional context. It reflects the ego being more capable to opening itself to a self chosen ideological position.

The considerations and reflections about these conflicting self-other contexts in this SOT transition can be assumed to necessarily involve the hypothetical consequences of the self-system acting in for instance other systems, contexts and cultures for the triggering of a transformation to a higher SOT order. Such way of reasoning does not appear as being possible to perform according the 10th formal MHC order. Instead, the 11th systematic order of hierarchical complexity reasoning seems to be adequate. As described this order enables logical reasoning about how a change in one element (X) leads to a corresponding change in another element (Y). Mathematically this corresponds with the construction of multivariable functions. When reasoning about hypothetical consequences of actions this kind of reasoning enables to consider differing consequences of different systems and “situate events and ideas in a larger context, i.e. considers relationships in contexts; form or conceive systems out of relations: legal, societal, corporate, economic, national” (Commons, Ross, & Miller, 2010: 6). The systematic order of reasoning enables the creation of a coherent system, such as a feedback loop: “An increased level of carbon dioxide leads to global warming which leads to an even higher level of carbon dioxide, and so forth.”

Thus, the logical tool here enables reasoning in terms of possible feedback loops and “spiral processes” of the more or less desirable consequences acting in accordance with institutional and ideological values and goals. In the transformation step here the values and goals of the former self context is being internalized as subordinated in the frame of visions and strategies related to new societal discourses and meaning making. The former subject as “a societal-institutional self-meaning context” has become an object to consciously coordinate in a new, larger and more symbolic complex meaning context on the 5th SOT order.

The 5th Self-transforming Mind Order

The subject here concerns “interindividuality, interpenetrability of self systems” and the object “authorship, identity, physic administration, ideology” (Kegan, 1982). This has resulted in a new balance at a higher order, formulated as the GSA regarding the relating of self to others, reflecting the X equilibrated stage 5th order of consciousness:

Subject's intuitive frame: “I am my visions and strategies of my ideological-collective meaning context.”

Latent “self-other” duality co-ordination: “I am my visions and strategies coordinated with those of my ideological-collective meaning context.”

The subject’s GSA initially in balance in the initiating step at this order implies that the person’s visions and strategies is perceived as mutually interwoven with those of the ideological-collective context. The MHC order that seems to constitute the minimal capacity required to discern and grasp the abstraction level associated with this ideological-collective context seem to be the 11th systematic order. The self-meaning context has consequently been transformed to a self capable of moving beyond the societal-institutional meaning context, subordinating this context within the frame of one’s own visions and strategies. Thus, the meaning constitutive coordination at this SOT order concern the visions and strategies of the “self-part” and those of the “other-part.” The “*transition step*” here involving the *deconstruction* and *reconstructing* of the self-other regulating might concern doubts about the self’s identification with its collective-ideological visions and strategies. Comparing reflections might for instance be about, on one hand, there might be too much collective disadvantages for maintaining the individual’s freedom in a market economy or, on the other hand, there might be too much individual disadvantages, such as lacking freedom to maintain a centrally regulated plan economy.

Experiencing and reflecting about such dilemmas, initiating the differentiation sequence, may result in increasing insight that if the strategy of a certain ideology is adopted by everyone, there will still be a lot of losers. The integration sequence, might be formulated as an increasing insight of the desirability of an other-meaning context of a larger collective stream of human growth. Thus, the duality positions involved in this transformation can be formulated as “I am my visions and strategies *differentiated* from my ideological-collective context” focusing the self-part of the meaning context duality and “I my visions and strategies *integrated* in human development and growth” focusing the “other meaning context duality. These two meaning contexts appear to be grasped and discernible as “abstractions” on the MHC 11th systematic order of hierarchical complexity. But also here, the transformation towards a higher SOT order seems to involve logical reasoning on a higher MHC order, in this case the 12th order of hierarchical complexity. This logical reasoning “tool” enables the coordination of more than one system. As described, the ego here is regarded as capable to compare or combine coherent systems as well as being able to compare these with reality by analyzing discrepancies and discern interactions between them. The transformation step and internalization process here results in a more complex balance where the hallmark can be understood as an emphasis on development and growth where the self-other distinction is being less articulated and the boundary between them has been loosen. Thus, it is the growth of human beings rather than the growth of scientific knowledge and economic or material growth that is meant.

This description of the fifth SOT order of consciousness involves both the initiating step and the transition step towards a hypothetical more complex SOT order. It is being characterized as being a dialectical and trans- or post ideological one, involving the capacity of dealing with paradoxes, contradictions and oppositeness. This seems to reflect a dialectical way of thinking, elaborated by Basseches (1984) and Laske (2008), implying patterns discernible as changing wholenesses rather than accumulations of fixed truths. The relating of self to others may concern the capacity to embody multiple ideologies and many coherent systems of personalities and still being able to continue the process of self-actualization and transformation. The “self” here thus

seem to concern the subject as an ongoing, evolving and transforming movement while “others” here concern an interwoven such a collective movement of interrelated societal and cultural patterns. However such a self-other balance in our examination seems to be generated rather at a hypothetical 6th order SOT balance than characterizing the 5th order balance. This seemingly confusion of what constitutes the 5th SOT order of consciousness can be interpreted in the frame of a more general confusion of the conception of stages as structures or process which will be further discussed in the following discussion section. The result of the comparing “thought experiment” can be illustrated in Table 3 below:

Table 3. Meaning making and logic reasoning in three consciousness orders and transitions.

<i>SOT meaning making order and transitions</i>	<i>MHC logical structures and reasoning involved</i>	<i>Subject: Self-other General Stage Assumptions deconstructed and reconstructed</i>	<i>The internalization process</i>	<i>Object: Self-other regulation internalized in higher orders</i>
3rd order, Socialized mind	9 abstract order: Concrete elements form abstract variables (e.g. X, Y), e.g. categories such as time, place, everyone, teacher 10 formal order latent	“I am my needs and interests of my close group meaning context”		
3/4-transition	10 formal elements and operations involved: Abstract variables e.g. cause and effect relationships (if X then Y), “An increased amount of carbon dioxide in the atmosphere leads to global warming”	Self: “I am my needs and interests differentiated from my close group meaning context” Other: “I am my needs and interests integrated in a larger social meaning context”	Differentiation-Integration sequences Lower order self X being internalized in higher order self Y X(Y) X/Y – Y/X, Y(X)	
4th order, Self-authoring mind	10 formal order 11 systematic order latent	“I am my values and goals of my institutional -societal meaning context”		“I am my needs and interests etc. of my close group meaning context”
4/5 transition	11 systematic elements and operations involved: Formal relations coordinated; functions, equations with more than one variable, feedback loops: “Increased levels	Self: “I am my values and goals differentiated from my institutional –societal meaning context” Other: “I am my values and goal	Differentiation-Integration sequences Lower order self X being internalized in higher order self Y	

	of carbon dioxide leads to global warming which leads to even higher level of carbon dioxide etc.”	integrated in a larger collective-ideological meaning context”	X(Y), X/Y – Y/X, Y(X)
5th order, Self-transforming mind	11 systematic 12 metasytematic order latent (e.g. combining and comparing systems)	“I am my visions and strategies of my ideological-collective meaning context	“I am my values and goals of my institutional – societal meaning context”

The Self-transforming order of consciousness exceeds the highest of Piaget’s stages. It seems reasonable that this characterized Piaget’s own way of thinking since he considered an individual as a self-transforming system who creates new structures during the course of development in interaction with the surrounding world. This process and its driving forces (such as accommodation, assimilation, equilibration, and transformation) are described differently than the description of formal logical operations (such as equivalence, mutual implications, and negations). However, Piaget did not seem to claim that cognitive development ends with formal operations. He rather seem to have meant that these operations constitute the final form of equilibrium, in terms of coordinating the groupings that earlier have not been coordinated in a single system (Lourenco & Machade, 1996).

This way of coordinating was not considered as changing during adult life, but it was understood as possible to integrate into larger systems. The “elements” that are being coordinated consists of increasingly abstractly defined categories. According to Piaget they would not be logically more complex. But according to MHC they would be more complex in terms of the abstraction levels of the coordinated elements and according to SOT more complex in terms of interrelated meaning categories. Cook-Greuter (1999) claims that the conceptions of what follows beyond formal operations can be divided into two trends. One of these conceive the further development as an ongoing differentiation and integration process towards more mental flexibility, the other conceiving development as a step-wise deconstruction of subject-object boundaries. The former trend may be compatible with logic in the frame of complexity theory and non-linear mathematics, while the latter trend rather may concern a phenomenological understanding and ideas from quantum physics. The concepts of postformal and dialectical thinking have been criticized as lacking theoretical clarity and that the notion of “integrative thinking” therefore should be used instead, referring to both additive and transformative process characteristics (Kallio, 2011). Here further research and theorizing is required.

Concluding Summary

On the base of the “examination” performed across the three SOT orders restricted by the assumption and clarifications described, the following conclusions seem to be reasonable:

1. The assumptions and clarifications seem to make the SOT and MHC discernible as distinct diverse structures derived from Piaget’s perspective of those structures considered as more

- implicitly interwoven. This concerns not at least the understanding of the SOT meaning making as self-other coordinations of duality elements being contextualized as self-other meaning contexts expressed in terms of the General Stage Assumption stated.
2. Further, these assumptions and clarifications appear to make the ego in these coordinations discernible as an “active agent” driven by increasingly complex motivational drives and corresponding increasingly complex goal orientations, being increasingly able to act and be involved in more complex external contexts.
 3. The testing “examination” across the three initiating, transition and transformation steps appear to make the SOT process discernible from a psychological inside perspective regarded as a person’s way of contextualizing his/her conflicts and challenges in terms of self-other meaning contexts being experienced as balance disturbing conflicts and challenges.
 4. The testing “examination” also seems to make the logical reasoning and meaning making aspects discernible as structurally and functionally interrelated in the development process. Logical complexity according to MHC appears as a condition to cognitively grasp the “self-other” meaning context categories as necessary but not sufficient condition to be able to coordinate these. Further, the logical reasoning that appear as a necessary condition to trigger the transformation step seem to be at least one complexity order over the MHC order necessary for initiating the transition step at each SOT order.
 5. Thus, these conclusive suggestions of the interrelatedness of logical reasoning and meaning making, although conceiving each of them as distinct differing lines of development in their own respect, still suggest them as being necessarily interlinked in the SOT meaning making process.
 6. The generality claims of both models might be argued for without one of them being regarded as necessarily subordinated the other one. However, such a conclusion brings to the fore further considerations of what constitutes their generality claims beyond their “hard stage” characteristics. This concern e.g. their content, functions, causal relatedness and mutual embeddedness.
 7. Taken together these outcomes from the thought experiment and interpretation of them bring to the fore a seemingly need for a shift from a focus on the development stage classification to a focus on the underlying developmental process in constructive development stage theory and research, although still take into account the structure and process dynamic as a wholeness. The process focus involves the inside-out as well as the outside-in conditions influencing development. A focus shift towards the underlying process dynamics that inter-relate stages, transitions and transformations will promote a “contextualization” lens on constructive-development stage theory and research.

Discussion

The aim of this article is to discern general features in adult development stage structures and transitions in terms of logical reasoning and meaning making. By way of introduction it should be underlined again that the conclusions that can be drawn on the base of the thought experiment cannot be claimed to provide “truths” or empirical evidence, but in best case theoretical insights and fruitful hypotheses triggering the discussion in the field a bit forward. The following final considerations aim at elaborating more in depth and breadth on the issues brought to the fore by our comparing approach and the summarized conclusions made. *First*, the relevance of different

generality claims will be discussed in terms of two approaches. *Second*, this raises questions about the differing subjectivistic and objectivistic “scientific positions” of SOT and MHC that will be considered and again related to their inspiration source, Piaget’s theory. *Third*, this leads to taking into account both inside-out and outside-in development influences when considering the distinctions between stages, transformations and transitions. *Fourth*, it is argued for the need to contextualize individuals’ developmental possibilities in for instance the frame of a “transform-actional approach” to meet postindustrial demands and challenges.

Generality: Causal Sequences, Existential Depth and/or Mutually Interlinked Processes?

To summarize, generality in development stage theories has commonly been related to strong development criteria and hard stages, typically Piaget’s theory of logic development, such as universality, fixed sequentiality, irreversibility and qualitiveness leaps. Piaget’s understanding of logic as interwoven with meaning implications implies both these aspects as constituting general features of the stage developmental process. However, he did not explicitly clarify how these aspects were interrelated in this process. As a way to clarify this further, logical reasoning according to MHC and meaning making according to SOT was compared in terms of the assumptions and conditions related to a thought experiment. The fact that each of these neo-Piagetian theories was an advocate of high “hard stage” generality claims and at the same time focused on either of these aspects justified the choice of comparing their approaches. The questions concern, as described, if, how and why they are, hierarchically and/or causally subordinated in generality terms, and/or interrelated in the development process.

One way of judging this can be expressed as the “the causal-sequential approach.” This concern sequential links between domains in terms of necessary and sufficient conditions for development (e.g. Pintrich, 2002; Colby, Kohlberg, *et al.* 1987). Advocates of this position may for instance argue that “...the operations in question will necessary be exhibited first in the response to logicomathematical or physical problems, next in response to social problems, and last in response to moral problems” (Colby, Kohlberg, *et al.* 1987, p. 13). According to these authors, such a scientific position has gained a substantial empirical support. An at least implicit assumption here seem to be that necessary structures are more basic and thus more general in that respect. A radical such a position is to consider other domains as direct manifestations of such basic ones. Following this line of reasoning may end up in distinctions of a “hen-egg” type, reflecting an “evolutionary” perspective and biological explanations. The “causal-sequential approach” may imply that the “formal” character involved in logical reasoning “translated” to and manifested in other domains constitute the underlying driving forces in stage development. Thus, the “hard stage” character of other domains is assumed to indirectly reflect the “strong” development necessity drives related to for instance axiomatic logic premises which concern the “formal” structural and dialectical aspects of development.

Another way of judging generality can be expressed as “*the existential depth approach.*” This approach is related to the content and functions of development stages and its transformations. This wholeness express a both broader and deeper meaning of the self-other coordination, reflected in its dualistic character of something that has to be coordinated one way or another. The self-other coordination reflect, according to the “Piagetian framework” the essence of ego,

acting and interacting in an environment (the biological aspect) reflecting the essence of adaption and coordinating subject and object (the philosophical aspect) reflecting the essence of truth. Thus, the wholeness of this process involves both a *broader* and *deeper* conception of the self-other coordination than being limited to strictly social aspects. The process should rather be conceived as an evolving ego as essentially being a meaning constituting movement and activity.

Therefore, the existential depth of a SOT “self-other” coordination might be understood either as one of a person’s many functions or rather as a central and holistic tendency in a person’s organizing of meaning. SOT take this latter position and claims that this perspective “...is the very ground of personality itself - it *is* the person” and “...where ‘person’ is understood to refer as much to an activity as to a thing” (p. 3 and 7/8 respectively, Kegan, 1982). Ego here refers to a central organizing tendency and as the activity of meaning making towards more complex structures. It can be conceived as underlying other forms of cognitive, physical or social coherence structures including those focusing the self-other coordination in more delimiting respects such as Kohlberg (1987), Selman (1980) and Skoe (2014). The conception of ego in terms of an underlying form or process can be expressed as an “epistemological structure”: “...what we know about our way of knowing” where “the subject-object relationship forms the cognate or core of an epistemology” (Kegan, 1982, p. 53). Thus, the reduction of the SOT development process that appears to be the consequence of focusing on the self-other coordination is not to be regarded as trivializing this theoretical approach in any way. As hopefully has been clarified, the self-other coordination is not restricted to taking others’ perspectives in social interactions or being understood only as individuals joining increasingly larger collective categories. As described, it rather concerns how these self-other categories, conceived as meaning contexts, are coordinated by a person’s actions (motivationally and directionally) on increasingly complex orders using increasingly complex logical “tools.”

A conclusion of these lines of reasoning seems to be that logical reasoning may be regarded as more general than meaning making according to “*the causal-sequential approach*,” and meaning making as more general than logical reasoning according “*the existential depth approach*.” At the same time the thought experiment indicates that the SOT and MHC complexity defined in their own terms correspond with each other stage wisely even if the number of proposed stages differs. This reflects that the MHC stages were found being involved in the differentiation-integration “positioning” in the transitions between the SOT stages. Increasing meaning making complexity seemed to be promoted by correspondingly increasing logical reasoning complexity in the deconstruction and reconstruction of the self-other dualities. In this way logical reasoning can be said to constitute a necessary but not sufficient condition for development of meaning making, being more general in this respect. At the same time, meaning making can be understood as more general due to its embedding of this logical capacity as a subordinated “tool” in this more identity constituting developmental process. As already stated, a main conclusion from the thought experiment is therefore not that one of the aspects is subordinated the other one in a more absolute sense. The conclusion rather is that both aspects are necessarily interrelated in human development, and at the same time seem to constitute diverse generality high and maybe essential features in their own respects.

However, this raises further issues about how logical reasoning is related to meaning making. The hard stage character of MHC refers, as described, to its hierarchical principles and axiomatic

operating logical principles. These stipulate necessary conditions for transformations of logical reasoning to occur. The qualitative leaps are due to new ways of solve logical problems. The correct solutions define the stage levels and this is regarded as theoretically reflecting both functional and structural aspects: “The functionalism is that stages are based on performance of tasks. The structuralist part is that sequences that are generated using the MHC are ordinal structures. Each order is qualitatively different and irreducible to any of the lower orders” (Commons, Ross, & Miller, 2010, pp. 10ff.). The generality claims of both the SOT and the MHC theories concern their dialectical thesis-antithesis-synthesis character. However, the interrelatedness of these two processes in “real life contexts” may not necessarily seem to imply the competence of logical reasoning in a strictly mathematical respect. The MHC functionalism based of the performance of tasks reflects a connection between logical operations and actions in terms of internal action sequences being logically coordinated to reach external goals. Logical reasoning is thus regarded as generating actions but action coordination may also, the other way around, generate logical reasoning. Action coordination in this sense does not necessarily seem to require being sequentially preceded by the axiomatic-mathematical operations. Thus, logical reasoning in pure axiomatic-mathematical terms might not be either a necessary or sufficient condition for meaning making, even if logic in verbally reasoning terms seems to be necessarily involved. “Semantic” logical reasoning may also be at hand before its strictly mathematical manifestations have developed. This tentative conclusion would at least constitute a hypothesis to be tested. The necessary conditions for the meaning making development process to occur using the necessary logical “tool” may, in turn, require demands and challenges in the external context to be triggered.

Differing “Scientific Positions”

The SOT understanding of the self relating to others partly appear to express the distinction made by one of his inspiration sources, George Herbert Mead, between “I” and “me” as mutually related in a dialectic wholeness as constituting the ego (Mead, 1934/1967). “I” reflect the here and now acting ego, while “me” concern ego’s conception of his/hers social roles. “I” seem to concern the non-reflected actions of the ego that resembles the SOT conception of the “subject” in a balanced phase of a consciousness order, while “me” can be related to reflecting on these actions and their social consequences, resembling the SOT conception of the “object.” Mead’s ego conception reflects a social behaviorist perspective of ego, a perspective differing from neo-Freudian psychology ego conceptions (see Kegan, 1982). This brings to the fore not only the differing philosophical inspirational sources behind the compared theories but also the implications of their differing “scientific positions.”

The self-other meaning context coordination involved in SOT can be conceived not only as an epistemological but also an ontologically matter: “...what is at stake in preserving any given balance is the ultimate question of whether the “self” shall continue to *be*, a naturally *ontological* matter” (Kegan, 1982, p. 12). These epistemological and ontological aspects of the SOT self-other coordination seem to justify its generality claims as of a basic character in its own respect. This can be concluded also regarding the axiomatically-mathematically defined MHC process. However, the SOT process clearly focuses on development from the inside while MHC focuses it from the outside. The epistemological and ontological character of the SOT self-other coordination concern universal “inside” aspects such as “...what it means for us that our world

designs cohere and fall apart; to crisis, anxiety, the defenses, all newly understood; to the uses of pain, to meaningfulness and meaninglessness, breakdown and breakthrough, to the very movement of meaning” (Kegan, 1982, pp. 12ff.).

How are these inside and outside positions related to each other in a more overriding “scientific-theoretical” perspective? As described, the hierarchical and dialectical change characteristics of SOT and MHC can be traced to Piaget’s theory. The idea that higher structures integrating lower ones in a centering-decentering process in Piaget’s theory seems to correspond to the subject-object dialectic in SOT and it also seems to be possible to conceive the MHC transformations in these terms. The differences concern the constructivistic character of Piaget’s theory and SOT that is not found in MHC behaviouristic approach. Constructivism refer to the subjective process of constructing, deconstructing and reconstructing a given stage structure. This difference between the theories can, in turn, be related to epistemological and paradigmatic issues. Beside the content difference, these differences also concern the investigating of the study object from inside or outside and using quantitative or qualitative data approaches, as mention in the introduction.

As already mentioned, focusing the study object from the outside, using quantitative data and formal aspects can for instance be associated with an “objectivistic” paradigmatic position to science related mainly to criteria from the natural sciences and positivism. Focusing the study object mainly from the inside, using qualitative data and preferring content aspects tend to be related to a “subjectivist” paradigmatic scientific position with criteria emanating from social sciences and the humanities (see e.g. Cohen, Manion, & Morrisson, 2000). The scientific position of Piaget seems to constitute a mixture of these focuses. This seem to reflect his background in the natural sciences (biology) and his “in-between” position in linking logic and meaning to create a “psycho-logic,” as outlined above.

Piaget focused on logical reasoning from the inside and regarded that as a legitimate study objects. But he also studied the investigated object from the outside, and took into account social aspects. However, a social factor, he argued “... is a fact to be explained, not a fact to be invoked only as an explanatory factor” (Piaget 1946/1976b, p. 10). This constructivistic “meaning link” reflect an “inside perspective” and a “subjectivistic” paradigmatic position. At the same time he formalizes the logic in mathematical terms and underlined the form or formal aspects of the developmental process. This is mainly related to the “objectivistic” position, as well as his use of “behavioral” criteria judging children’s solving of cognitive-logical issues in experimental designs. Thus, he was not clearly restricted to either of these two paradigmatic positions but rather took a more flexible standpoint.

The differing paths from Piaget taken by SOT and MHC concern the latter as focusing on the study object from the outside by means of applying a mathematical approach and SOT focusing on the study object from the inside using a qualitative approach. The MHC limitation of logic to its axiomatic mathematical aspects follows Aristotle’s codifying of logical reasoning that states that inference logic axioms and logical arguments starting with postulates (Commons, Ross, Miller, et al., 2009). MHC focuses on behavior outcomes and requires at least two independent “paths” of a mathematical-logical, phenomenological and empirical “ways of knowing.”

Behaviorism concerns broadly the confirming of hypotheses of psychological phenomena in terms of behavioral criteria, thus demanding behavioral evidence for such hypothesis. This seems to correspond with the MHC position in this respect. A strictly behavioristic position can be said to understand behavior as caused by external conditions and furthermore, that mental terms in explaining behavior should be eliminated and replaced by behavioral concepts. A strong behavioristic position rejects the conception of human free will (Skinner, 1971). But even if the MHC position is not that extreme since it allows “events” beyond behavioral ones, covering emotions and attitudes to be included as constructs to be studied indirectly (Commons, 2001), it takes a rather different scientific standpoint compared with SOT. The latter approach primarily focus on the mental stages of meaning making as legitimate study objects. The study of mental structures as general organizing principles in the SOT frame of reference focuses, as described, on their underlying meaning consistency. Following Colby, Kohlberg and colleagues way of reasoning about this (1987), “... to achieve this understanding, one must adopt the subject’s point of view and grasp the sense the argument make to that person” (p. 3). In this way the structuralism approach can be considered as related to phenomenalism.

SOT, referring to traditional scientific criteria in social sciences (construct validity, statistical reliability etc.), provides knowledge from the “inside” subjectivist position, which makes it necessary to understand the content of meaning making as a wholeness. MHC contributes with e.g. an “outside” objectivistic analytical stringent tool to discern the “mathematical-logical” structure involved in “hard stage” structures and transformations (in terms of one-dimensionality according to Rasch mathematics, see e.g. Bond & Fox, 2007). Instead of regarding for instance epistemological assumptions as necessarily embedded in basically conflicting paradigms, they could rather be conceived as compatible in providing “hard” and “soft” data and strengthening empirical findings, such as by means of triangulations (Bryman, 2004).

The constructivistic characteristic of Piaget’s theory and SOT bring to the fore the relation between logic and action with implications for how to conceive causal mechanisms in development, from the inside-out or outside-in directions. Following Piaget’s thinking, logic is not isolated from life. It rather reflects the operational co-ordinations that are substantial to action (Inhelder & Piaget, 1958). Inside-out aspects concern inner “drives” to reach logical consistency as well as create meaning consistency. Both processes seem to reflect the constructivist character of the developmental process of acting and interacting persons in a societal context trying to reach meaningful goals and solve problems when doing so. This process is also more or less promoted or restricted by external demands and challenges.

Stage Transitions and Transformations

As described, our perspective on stage structures and their transitions in the thought experiment was framing them as dialectical more or less dynamic movements between balanced (equilibrated) and imbalanced (disequilibrated) stage structures and their transition phases in this movement. As also has been outlined, this framing makes the process more discernible in phases of initial balances, transitions and transformations. Moreover, this movement may concern different kinds of “forms” of coherences being transformed (such as meaning making and logical reasoning). Taken together these presumptions result in stage-transition distinctions than differ compared with those generated from “taxonomy approaches” derived mainly from stage

structure criteria. Our two presumptions enabled a clarified suggestion of how MHC orders are involved in the SOT order transitions. Thus, our interpretation is derived from both the conception of SOT as a constructivist-dialectical process and the conception of the differing but interrelated functions of meaning making and logical reasoning described in the SOT transitions and transformations.

When lacking for instance such constructivistic judgment criteria, the distinctions between stages and transitions become less obvious as well as what characterizes transformations. In the somewhat overlapping theoretically multifaceted field entitled Transformative Learning Theory, focusing adult learning in for instance more applied-contextualized and ideological critical terms, the “formal” constructivistic development line of reasoning is not the central theoretical base. Issues here concern for instance the functions of the transformations and the interrelatedness of individual personal growth and social changes (e.g. Taylor, 2009). However, without clarified conceptions of what is constituting the form of coherence that is developing it becomes harder to judge how such a form is being “trans-formed” (for a discussion, see Mezirow, 2003; Kegan, 2000) and deciding stage-transitions in such terms.

However, as indicated in the introduction, also within “softer” approaches in adult development stage theories focused in this article, the stage-transition conceptions differ compared with the “hard stage approaches.” Results obtained using Loevinger’s (1976) strictly psychometric inductively based stage model doesn’t imply a constructivistic “necessity” rationale driving the transitions between stages. This theoretical position also seem to be related to her suggestion of more stages compared with the number stated by SOT, including stages that correspond roughly with the transitions in SOT. The conceptions of stages and transitions have changed in this model since the self-aware and the individualist stages in this model first were considered to be merely transitions between the conformist and conscientious stage, and between the conscientious and autonomous stages, respectively. But suggestions of new stages and transitions have been common also within the frame of more constructivist models. Adding a new stage or a new order to a stage theory occurred more than once during the development of MHC in the 80s (Commons & Ross, 2008) and just recently (Ross, Commons, Li, Stålné & Barker, 2014).

Cook-Greuter (1999), highly inspired by both SOT and Loevinger’s theories, conceive stages and its transitions as dialectical forms of knowing that integrate affect, intuition and rational thought. This results in an understanding of transitions in the SOT as stages in her own model. Stages are here characterized by persons’ alternating between differentiated and integrated ego positions regarded as “...organic wholes, as relatively stable balances within which adults stay settled for long periods of time, often for a life time” (Cook-Greuter, 1999, p. 53). In total ten stages are proposed that reflect stages of differentiation exchanged by stages of integration. The integrated stages here are regarded as more balanced than the differentiated stages. The latter ones seem to correspond with transformational positions in SOT and the integrated stages correspond with the stages in SOT.

In a way Cook-Greuter’s model can be said to take a position between MHC and SOT but implying less generality claims regarding the universality of the stage structures and its transitions. But Kegan, in his first conception of the stages (1982), also conceived them as either

favoring independence or inclusion. Later (1994) he found that he thereby confused “style” with “structure. He concluded that such increasing differentiation or increasing autonomy is characterizing everyone’s development, but claimed that increasing differentiation in itself can be conceived as staying connected in a new way. Increasing autonomy therefore does not have to be about increasing aloneness, but instead about increased self regulation: “Deciding *for* myself” does not have to equal “deciding *by* myself” (Kegan, 1994, pp. 21ff.). Thus at each stage, connection and separation are regarded as integrated in a wholeness which both can be expressed within the given complexity meaning structure.

The fact that transitions in “hard stage” models are conceived as stages in “softer” stage models seem to reflect the latter models’ higher sensitivity for the “outside-in” direction of the developmental process. The fact that the self-aware stage in Loevinger’s theory, entitled as “expert” stage in another version (Hy & Loevinger, 1996; Fischer, Rooke, & Torbert, 2003) is conceived as a stage and not a transition may be understood as a consequence of organizational and societal demands on people in modern society. At this “stage” persons tend to follow formally stated rules and regulations and administrative operations common in traditional hierarchical organizations that may hinder further individual development also when applying decentralized organizational forms (e.g. Göransson, Hagström & Backström, 2011; Hagström, Backström & Göransson, 2009). Moreover, the increasing demands in post industrial society of flexible functioning individuals and decentralized organizations may have stabilized a seemingly increasing frequency of persons at the individualist stage, also conceived as a transition in SOT. This is especially apparent among highly educated people characterized by a relativistic or even nihilistic frame of reference, also referred to as a deconstructive postmodern way of thinking.

Consequently, the definition of stages and transitions is related to “hard-softness” criteria. Softer criteria are more sensitive to contemporary social-cultural-societal conditions that for instance hinder hard stage development. This brings to the fore issues of how cognitive logical structures are related to the functioning of the individual in a given context or domain. These structures may, although they may trigger logical thinking inside-out, not necessarily directly lead to functional behavior. Piaget did not appear to think that the assimilating of the logical structures as the whole meant that they were responsible for all cognitive manifestations of a given stage (Lourenco & Machado, 1996). Logical stage structures as a whole were seen as formal criteria to classify thinking not as “... a sort of super functional totalities that regulate performance” (Lourenco & Machado, 1996, p. 152). Mental processes were focused in their construction and stages were conceived as tentative tools to analyze such processes rather than as ends in themselves.

This way of focusing the construction of logic appears as a plausible way of relating logic to external demands and challenges. Our example in the thought experiment can illustrate this. In the SOT 4th (Self-authoring mind) transition, the MHC 11th systematic order of reasoning is regarded as a logical “tool” enabling to create a coherent system, such as a feedback loop: “An increased level of carbon dioxide leads to global warming which leads to an even higher level of carbon dioxide, etc....” This reflects a capacity to understand formal relationships in different e.g. cultural cultures contexts and within differing ideologies including moral and value based judgments. Differing contexts may or may not trigger the application of for instance logical thinking in other different “domains” such as in meaning making and moral judgment. Such a

process is not mechanically driven. It involves both inside out and outside-in parts of the development process. Thus, excellent thinkers on very high MHC order of logical complexity in the history of science (see Commons, Ross, & Bressette, 2011) might not correspond with likewise high orders of other developmental domains reflecting personal maturity as indicated in biographies, according to Cook-Greuter (1999).

The Contextualization of Constructivistic Development to Meet Societal Challenges

In the introduction of the article three main theoretical issues related to constructivistic development theory and research were briefly outlined, namely the causal mechanisms involved in terms of inside-out or outside-in direction; the way of approaching these issues as “objectivistic” or “subjectivistic” scientific positions, and; the understanding development as progressing continuously or discontinuously in terms of stages or functions. The scientific positioning issue has already been approached but the other aspects will be somewhat considered. Our thought experimental approach can be regarded as a way of “contextualizing” constructivistic development theory. Focusing on the generality aspects can be regarded as a way to discern core elements involved in the constructivistic process that trigger developmental transformations and our examination seems to support the assumption that logic reasoning and meaning making constitute such core features.

These core elements and their coordination also seem to reflect the motivation to act and the direction of these actions to fulfill demands and meet challenges in external contexts in the direction inside-out. The demands and challenges, in turn, are supposed to influence a person’s acting and trigger his/her development in the direction outside-in. Our General Stage Assumptions can be considered as an ambition to illustrate such general contextual demands and challenges in contemporary societies. The fact that the constructivistic development “hard stage” theories often seem to have been positioned as representing an inside-out intrinsic and even “individualistic” standpoint compared with other outside-in positions, such as the one associated with Vygotsky’s theory, is not surprising. However, it does not necessarily follow by its “constructivistic” characteristics.

The external demands and challenges in a constructivistic developmental frame are not to be considered as mechanically influencing a person’s action orientation regarded as e.g. “causal-independent variables.” As Piaget appeared to reason the outside-in influences are to be explained not as explanatory in themselves, but in terms of them being constructively experienced (Piaget 1946/1976b). However, this constructivist “link” between the inside-out and outside-in influences do not in any way exclude the latter ones as highly influential. Instead they can be conceived as person’s scope or space of action in for instance a given conflict between his/her self-meaning context and other-meaning context. The perceived space of action here reasonable differs at increasing orders of SOT. Further, the action possibilities can be stated in more outside-objectively defined terms. Action theoretical lines of reasoning (for instance Hagström & Hanson, 2003) and its application in the work life domain (for instance Volpert, 1989; Frese & Zapf, 1994) may be fruitfully related to constructivistic-developmental lines of reasoning (Hagström, 1995) in the frame of what we prefer to call a “transform-actional approach.”

Furthermore, the reasoning of the influence of outside-in part of the development process brings to the fore contemporary and forthcoming complex societal and global demands and challenges. Contemporary post-industrial challenges involve a need for complex thinking, both logical reasoning and meaning making. In terms of Mead's ego conception described above, rapidly economic and technological changing conditions in the transition to a post-industrial society may result in increasing gap between "I" and "me" in terms of changed societal role expectations (Allvin, 1997). These changing conditions apparently require logical reasoning on higher levels of at least systematic and metasytematic orders of hierarchical complexity. Such demands appear to exceed the order of consciousness among a majority of adult populations. In e.g. the US a majority of adults in many studies have been found being below that of the 4th Self-authoring order of consciousness (Kegan 1994; 2003). This cause much of public information flowing beyond many persons meaning horizon "in over our heads" (Kegan, 1994).

Transformative development is reasonable promoted by "the experience of optimal conflict in the context of optimal support" (Kegan, 2003, p. 44). Optimal conflicts refer to inside-out development conditions and optimal support can be associated with the outside-in development requirements. Both these aspects are also reflected in a person's subjective and objective "space of action." Thus a further contextualizing of adult development theory and research may be gained by "transform-actional" ways of reasoning. Further research and theorizing about adult development should be gained by relating the complexity levels to individuals' perceived space of action to more objectively derive such spaces of action in differing societal contexts. The demands in contemporary post-industrial societies towards increasing "disembedding mechanisms" (Giddens, 1991), due to dissolving boundaries of work in time and space, new network promoting connections, global economic transactions and so forth, seem to concern both individual autonomy (referring to a cognitive and an existential dimension) and social integration (referring to a social and societal dimension) (Allvin, *et al.*, 1997).

The opportunities provided by these conditions can be related to individual aspects, such as life courses, career patterns and biographies, as well as social aspects, such as social roles, group affiliations and role models. The new emerging challenge implied in this macro development is to integrate the social and existential demands on more autonomous and complex ways than before (Hagström, 2007). The broad value changes in postindustrial societies from giving priority to materialistic preferences towards given priority to post-materialistic values (e.g. altruism, self-realization) (Inglehart, 1997; 2006) seem to capture individual fulfillment and social integrative value elements guiding people's actions in more self directed ways than earlier. However, these changes, whether or not they are driven by intergenerational value shifts or life span development appear to progress more slowly than the faster global technologically and economically driven flexibility demands. These in turn, appear to reflect contrasting goals and visions related to the reproductive and productive spheres of contemporary societies, expressed e.g. in value preferences, enhancing on one hand individual interests and on the other hand, collective interests (Schwartz, 1996). Against this background increasing knowledge of both inside-out and outside-in conditions gaining transformative development is highly required to meet contemporary and future vital challenges.

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