

Rationale for an Integral Theory of Everything¹

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There are many ways of comprehending the world: through personal insight, mystical intuition, art, and poetry, as well as the belief systems of the world's religions. Of the many ways available to us, there is one that is particularly deserving of attention, for it is based on repeatable experience, follows a rigorous method, and is subject to ongoing criticism and assessment. It is the way of science.

Science, as a popular newspaper column tells us, matters. It matters not only because it is a source of the new technologies that are shaping our lives and everything around us, but also because it suggests a trustworthy way of looking at the world—and at ourselves in the world.

But looking at the world through the prism of modern science has not been a simple matter. Until recently, science gave a fragmented picture of the world, conveyed through seemingly independent disciplinary compartments. Even scientists have found it difficult to tell what connects the physical universe to the living world, the living world to the world of society, and the world of society to the domains of mind and culture. This is now changing; ever more scientists are searching for a more integrated, more unitary world picture. This is true especially of physicists, who are intensely at work creating “grand unified theories” and “super-grand unified theories.” These GUTs and super-GUTs relate together the fundamental fields and forces of nature in a logical and coherent theoretical scheme, suggesting that they had common origins.

A particularly ambitious endeavor has surfaced in quantum physics in recent years: the attempt to create a theory of everything—a “TOE.” This project is based on string and superstring theories (so called because in these theories elementary particles are viewed as vibrating filaments or strings), and it uses sophisticated mathematics and multidimensional spaces to produce a single equation that could account for all the laws of the universe. However, the TOEs of string theorists are not the definitive answer to the quest for a unitary world picture, for they are not really theories of *every*-thing—they are at best theories of every *physical*-thing. A genuine TOE would include more than the mathematical formulas that give a unified expression to the phenomena studied in this branch of quantum physics; there is more to the universe than vibrating strings and related quantum events. Life, mind, and culture are part of the world's reality, and a genuine theory of everything would take them into account as well.

Ken Wilber, who wrote a book with the title *A Theory of Everything*, agrees: he speaks of the “integral vision” conveyed by a genuine TOE. However, he does not offer such a theory; he mainly discusses what it would be like, describing it in reference to the evolution of culture and consciousness—and to his own theories. An actual, science-based integral theory of everything is yet to be created.

A genuine TOE *can* be created. Although it is beyond the string and superstring theories in the framework of which physicists attempt to formulate their own super-theory, it is well within the scope of science itself. Indeed, the enterprise of creating a genuine TOE is simpler than the attempt to create a physical TOE. Physical TOEs endeavor to relate together all the laws of

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physics in a single formula—laws that govern interactions among particles and atoms, stars and galaxies: many already complex entities with complex interrelations. It is simpler, and more sensible, to look for the basic laws and processes that *give rise to* these entities, and to their interrelations.

The computer simulation of complex structures demonstrates that complexity is generated, and can be explained by, basic and relatively simple starting conditions. As John von Neumann's cellular automata theory has shown, it is enough to identify the basic constituents of a system and give the rules—the algorithms that govern their behavior. A finite and surprisingly simple set of constituents governed by a small set of algorithms can generate great and seemingly unmanageable complexity merely by allowing the process to unfold in time. A set of rules informing a set of constituents initiates a process that orders and organizes the constituents in time, so that they create more and more complex structures and interrelations.

An integral TOE identifies the constituents of “*every-thing*” and states the rules by which the constituents relate to each other so as to form ever more complex things. It identifies the most basic kind of things that exists; the things that generate other things without being generated by them. Then it states the simplest possible set of rules—algorithms—that explain the emergence of the kind of things we have reason to believe exist. If it succeeds, it will be capable of explaining the origins of *every-thing* in the real world, together with the kind of relations that prevail among them. By extrapolating into the future, it will also be able to explain the kind of developments that are likely to occur: how the existing things transform their relations to each other in time, and transform themselves in the process.

The new physics gives us the basis on which this ambitious enterprise can be attempted. Using the findings of cutting-edge particle and field theories, we can identify the foundation out of which all things are generated without itself being generated by other things. This foundation is the virtual-energy sea known by the name of *quantum vacuum*. We can also draw on a large repertory of laws that tell us how the primary constituents of reality—the particles known as quanta—are generated in, and arise out of, this cosmic foundation.

The currently known laws by which the existing things of the world are generated from the cosmic vacuum are laws of interaction based on the transfer and transformation of *energy*. These laws turn out to be adequate to explain how real things—in the form of particle-antiparticle pairs—are generated in and emerge out of the quantum vacuum, but not how in the course of cosmic eons the surviving particles become structured into more and more complex things: galaxies and stars, atoms and molecules, and on suitable planetary surfaces also into macromolecules, cells, organisms, societies, ecologies, and entire biospheres. In order to account for the ongoing, if by no means smooth and linear, evolution of the existing things, we need to add an element of interaction that is additional to energy. The importance of this additional element is now recognized by more and more scientists. It is *information*—information as a real and effective factor governing evolutionary processes in all segments and domains of the known universe.

Most of us think of information as data or what a person knows. But the reach of information is deeper than this. Physical and life scientists are discovering that information extends far beyond the mind of an individual person or even all persons put together. It is an inherent aspect of both physical and biological nature. The great maverick physicist David Bohm called it “*in-formation*,” meaning a process that actually “*forms*” the recipient. This is the expression we shall use here.

In-formation is not a human artifact, not something that we produce by writing, calculating, speaking, and messaging. As ancient sages knew, and as scientists are now rediscovering, in-formation is present in the real world and is a decisive factor in the evolution of the things that furnish the real world. When we recognize that “in-formation” is a real and effective factor in the universe, we obtain the basis for creating a genuine “integral TOE.”

The concept of an in-formation- and energy-imbued universe, building itself from simpler beginnings to ever-higher peaks of complexity, is thousands of years old; it has cropped up again and again in the history of thought. It merits being known not only by scientists, but by everyone. First, because it is the key to creating an integral TOE, one that, though not the final word, brings us closer to understanding the fundamental nature of all the things that exist and evolve in space and time, whether they are atoms and galaxies, or mice and men. And second, because the in-formation- and energy-imbued “in-formed universe” is a meaningful universe, and in our time of accelerating change and mounting disorientation we are much in need of a meaningful view of ourselves and of the world.

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