Mind Matters

by Sam Mackintosh

Terrence Deacon is author of the well-received 1998 book *The Symbolic Species: The Co-Evolution of Language and the Brain* and is Professor of Biological Anthropology and Neuroscience at the University of California, Berkeley. In *Incomplete Nature: How Mind Emerged From Matter*, Deacon attends to what he calls "the unfinished business of science": understanding life and mind from a strictly scientific perspective. As such he identifies what he considers to be two impediments to this task: scientific reductionism and philosophical dualism.

Scientific reductionism aims to explain biological and human life entirely by the underlying physical and chemical processes of inanimate matter. The subjective, lived experience of meaning and value are not only

ignored but regarded as mere ephemera—indeed, unworthy of scientific investigation. Although few live as if this were an accurate assessment of human experience, reductionism is nonetheless a widespread view. Indeed, it is commonly misunderstood to be *the* scientific understanding of reality. *Dualism* is the opposite of reductionism. It is a philosophical (and often religious) perspective that insists not only that life and consciousness are something more than mere matter but that the "more" has been inserted into matter by a source external to the material world. Deacon disagrees with both perspectives. He laments, "Our best science excludes us." The point of his extended argument is that it need not.

Absential Influences

The human mind and heart are fascinated by the order perceived in the world: recurring patterns in the night sky, the cycles of the seasons, the six-pointed shapes of snowflakes. Deacon notes that such patterns

necessarily were explained in pre-scientific times by what he calls "absential influences"—magic, supernatural powers, divine intervention. In science, says Deacon, these "absential accounts" came into question beginning around the year 1850. No longer is "divine design" acceptable as a scientific explanation for anything. Instead, the modern mechanistic view ascended, reaching a zenith in the mid-20th century with the birth of ideas about "self-organizing processes."

Deacon avers that while *self-organization* is a misleading term (since there is no "self" involved in the formation of these natural patterns), it is in such common use now that he, too, employs the term. As well, while "self-organizing" concepts do help us better understand patterns in nature, they do not account for key thresholds in the *origins* of complexity. Notably, the "unfinished business of science" is to comprehend the processes by which the physical world gives rise to the living and, in a later step, to consciousness. Deacon stresses that in everyday life we act as

if we have goals for what we do. We presume that some outcomes are better than others, and thus we engage in specific tasks. In ordinary life, therefore, *purpose*, *value*, and *function* are central concerns. Yet science ignores them.

Deacon wants to bring them into the scientific fold through what he calls "ententional phenomena," which encompass these and other aspects of living systems for which *ends* or *goals* (*telos*, in Greek) are distinguishing features. Scientifically, one takes a wrong path by assuming that ententional phenomena are *embodied* in physical things or static material objects. Rather, life and mind *emerge* "from the dynamic processes which generate them." To ignore the ententional phenomena, cautions Deacon, would consign humans to the status of mere automatons, like the golems of Medieval stories or the zombies of contemporary science fiction films. Yes, there is human-like behavior in the purported actions of golems and zombies. But, as Deacon puts it, "nobody's home." As he

observes: “There would be no caring, no cared for, no kindness, no sharing of beauty and discovery and sorrow, no value to our pains and pleasures.” Indeed, for each of us, there would be no “me” at all. Reductionist materialism, says Deacon, “is impotent to explain the mystery of ourselves.”

If, on the other hand, we accept the dualistic view that life and mind are real because of an intervention from outside the material realm, this would just make us aliens to this world. Many people do experience this kind of alienation today, and Deacon holds that this is the root cause of our ecological problems. “We don’t owe the Earth much if we don’t belong here,” he notes, and thus a sense of “belonging in the universe” is humanity’s single greatest need.

Denial of the reality of “ententional phenomena” has divided the natural sciences from the human sciences, says Deacon, and has divided all of science from the humanities. It has alienated scientific knowledge from human experience, and that denial makes science appear to be the enemy

of human values—hence, the rebirth of religious fundamentalism with its deep distrust of non-religious explanations for the genesis of human values.

Deacon contends that to move beyond the impasse of rationalist reductionism and religious dualism, we need in science something akin to what *zero* is in math. Historically, any attempt to reify the concept of nothing was long shunned and feared. Once accepted, *zero* revolutionized calculations and made modern science possible. In our day, ententional phenomena are likewise waiting in the wings for their turn on stage. Deacon attempts to demonstrate the wonders of discovery and explanation that their admission will bring forth.

The Energy of Life

To bring ententional phenomena fully into the purview of science Deacon begins by categorizing three distinct levels of energy processes, which he labels *homeo-dynamics*,

morpho-dynamics and *teleo-dynamics*. In homeo-dynamics, the bits and pieces of matter move spontaneously from a higher energy state to a lower energy state. The shift goes from more to less orderly. We all know this process from personal experience: life is messy and things all too easily fall into disrepair. In physics, this process is described by the Second Law of Thermodynamics, but it's not really a law so much as a way of accounting for the relentless and inevitable increase toward disorder in the world.

Both *morpho* and *teleo* processes, however, work against this general thermodynamic flow. Both depend on an influx of energy from outside themselves and both result, thereby, in a spontaneous increase in order, regularity, and (sometimes) complexity. *Morpho-dynamic* processes yield regularly shaped but still-inanimate objects, such as snowflake crystals and convection columns in a pot of boiling water. *Teleo-dynamic* processes emerge from and sustain life and mind. At minimum, living things have a purpose (an end or goal): their own

persistence. Overall, it is probing into how these teleo processes actually work that can help us understand the *origins* of life and mind.

Deacon lists four major ways in which life-forms differ from the inanimate shapes born of morpho-dynamics. While morph-forms *result from* the surrounding environment, life-forms *interact with* it. Living things are also able to initiate changes *within themselves* in response to external changes in their environment, to "assess or evaluate various gradients in their surroundings" and to "move so as to anticipate and avoid depleted conditions and seek more optimal ones." Even at the level of one-celled organisms, living things have an inner agency, an authentic acting "self." They are not reducible to their components: they show different properties—and thus have a certain freedom—from what they are constructed. And even the most elementary kinds of living things reproduce themselves, resulting in *lineages* which (just as do individual organisms) adapt within and without to

environmental changes. Lineages unable to adapt go extinct, while those that do adapt sometimes evolve greater thresholds of complexity.

That life forms adapt and evolve is by no means an explanation for the *origins* of life and mind. The question of origins is thus "the great question for 21st-century science." How indeed did life and mind *emerge* during Earth's long evolutionary development? "We need to construct an understanding of *emergence* based on the dynamic cosmic processes," says Deacon. The idea of *emergence* is quite new; it does not date back to the time of Galileo or Newton, or even

Darwin. Rather, *emergence* "began to take on meaning only in the last years of the 20th century," and that, in turn, owes to the advent of high-speed computers.

Modern computers can run hundreds of thousands of iterations in a relatively short time, and this allows the pathways of physical, chemical, biological, and even social changes to be modeled and studied. Deacon points out that the concept of *emergence* is now used not just in computation and the physical sciences but also in economics, social studies, and business applications. To a great extent, then, the fundamental philosophical transition of our time—the shift from *stasis to dynamis* in our cosmology—owes to computer technology. Given the challenges confronting cultures globally, this dynamic, emergent worldview is an essential frame for getting on with "the unfinished business of science."

Emergence is a dynamic pattern that was invisible to the naked eye, but was revealed by artificial extensions.

Key to this new perspective is that *emergence* "does not mean new physics and chemistry laws but *new cause-and-effect laws*." And for that we need to examine more than the dynamic processes involving matter and energy. Deacon urges us to turn our attention to *relationships*. One aspect of relationship on which processes of emergence depend is *constraint*. When energy infuses a dynamic molecular system, something new will emerge only if the lower level homeo-dynamic and morpho-dynamic processes are constrained, are channeled. For example, the energy released in an internal combustion engine performs useful work only because the cylinder constrains the piston to move in but one direction.

Now here is the twist: *Morpho* and *teleo* processes are no less a norm in the natural world than are homeo processes. They will occur wherever they can; they *emerge* whenever the higher levels of energy are available *and* transition to the lower levels is restricted/constrained. Deacon offers an analogy from the ancient craft of silk

weaving. When threads of silk are woven together, all other random ways in which those threads might have been aggregated are prevented (excluded, constrained). While it is obvious that the resulting fabric isn't made of anything other than thread, it is also obvious that the fabric is much more than mere thread. We can do very little with heaps of thread compared to what we can do with woven fabric.

Just as the resulting fabric is "thread in relationship," so too are living things and human consciousness "matter and energy in relationship." By examining the growth of complexity and the genesis of telos in this way, Deacon notes, "The emergence of these attributes can be understood without attributing them to an external source or denying that a real threshold has been crossed." Thus, the unique characteristics of the fabric of life and mind are woven from the same matter and energy that constitute the rest of the world. There is complete continuity between the realm of physics and chemistry and the realm of life. Deacon

proclaims, “After 500 years of modern science we can stop saying to ourselves, ‘Maybe I don’t belong here.’”

Enformation is the basic substance of energy, and thence matter, and thence material reality.

Meaning, *purpose*, *value* and the other “ententionals” expressive of human life are no less real and natural than are atoms and molecules. Ententional phenomena are fully accessible to scientific inquiry. In Deacon’s view, they are poised to become the ‘zero’ that will transform modern science and implant our selves and subjectivity gracefully within the continuum of natural and understandable processes.