FORMS OF EMERGENCE

Walter Gulick

Keywords: Charles Taylor, Individualism, Michael Polanyi, Moral inversion (theory of), Psychoanalysis, Repression (theory of), Sigmund Freud, Vocabularies of Motive

ABSTRACT

In this essay I seek to clarify the unruly notion of emergence by describing three distinct varieties. I suggest that it is often fruitful to ascertain whether what emerges is an aspect of the physical world or a matter of novel meaning rather than quibble over whether emergence is an epistemological construct or is ontological in nature.

"Emergence is a perennial philosophical problem" (Bedau 2008, 155). Emergentism is a philosophical stance with a history: an early form of emergence is implicit in the Hellenistic philosopher Epicurus's denial of Democritus's claim that human choice and behavior can be reduced to the action of atoms. However, in recent centuries the success of reductionist approaches in scientific investigation—cause and effect theories explaining higher level phenomena by the laws of physics and chemistry or by the functioning of a phenomenon's underlying parts—has increased the temptation to extend reductionism beyond its relevance as a useful but limited tool of scientific inquiry to a general principle of understanding. But it is a foolish denial of personhood to accept an explanation of human thought and behavior that reductively privileges lower level phenomena. Human action cannot be understood adequately by referring to the controlling influence of such lower level factors as appetites, socialization, and genes. Such a view obliterates any notion of personhood and responsibility.

The social and moral shortcomings of scientism, positivism, behaviorism, and other reductionist and deterministic theories became evident in the course of twentieth century history. Emergence theory offers a well-established counter to reductionism

and other one-level systems of thought. However, as Bedau notes, articulating a clear notion of emergence has proved elusive. Is emergence compatible with a scientific understanding of the world? Given that the term is used in many ways, can a comprehensive and coherent account of emergence be formulated?

In this brief reflection, I will argue that the notion of emergence crucially aids clear thought about the structures and processes of reality. I will attempt to accommodate clashing uses of the term by distinguishing three ways in which new properties may emerge in the world. My ideas are most influenced by complexity theory and the thought of Michael Polanyi, who views emergence as not only compatible with science but as a key contributor to a comprehensive understanding of reality.

The key vision common to the various versions of emergence is that new properties arise that, once established, have an integrity different from and therefore not simply reducible to the properties or actions of contributing parts. The emergent entity is sometimes said to be autonomous in relation to its constituting phenomena. Human consciousness is, of course, the classic example of an emergent phenomenon. The content of what we think and perceive is not dictated by atoms, molecules, or even the actions of neurons in our brains. The person's response to what transpires in the world gets interpreted and coded at a lower biological level, but that lower level is essentially a servant of the higher level's interests and purposes. Through language and memory a person can envision different alternatives and choose between them for reasons. It is the person who is responsible for that choice and those reasons, not some lower level phenomena. Our higher level thoughts depend upon and are supported by lower level bodily properties and actions, but are not 'nothing but' lower level phenomena.

Emergence theory recognizes the reality of both the entities and events of an emergent level of reality and the lower level parts or functions upon which the higher level depends (sometimes called the principle of ontological parity). Yet the nature of the relation between the emergent whole and its parts varies considerably. I find it heuristically useful to distinguish between weak, moderate, and strong versions of emergence depending on the degree to which the emergent entity takes on not only different properties than its parts but also responds to different influences or takes on novel functions. The following three types of emergence describe three ways novelty arises in the cosmos.

1. *Weak emergence* exists where the properties of higher level phenomena can be seen to arise from lower level phenomena according to pre-existing natural laws and processes. Weak emergence is weak because there is no mystery about how it arises, but it is emergent because it has properties that its antecedents do not have. As an example from the physical world, within which weak emergence is virtually ubiquitous, when acids mix with bases, they form salts. As a more complex example, the earth's rotation, the rising and cooling of hot air, and topography are among the many

factors influencing the emergence of storm systems. In biology, genes interact with environmental influences and chance events to produce ontogenesis for individuals and evolution for species. An adult person has many properties not found in a four-day-old embryo, but the emergence of these properties through maturation is in principle, if not in detail, comprehensible. The role of natural pre-existing laws, forces, principles or recipes (as found, for instance, in DNA) lead to the emergence of new properties in ways that are theoretically comprehensible. This is bottom-up emergence. Be it noted that in our non-linear world, the notion of dynamic ecological interdependence often seems better able to describe how bottom-up emergence unfolds than the terminology of lower and higher levels.

2. The advent of purpose (conscious and unconscious) within the biological realm gives rise to *moderate forms of emergence*. A bird building a nest would be an example. A nest has an emergent function not resident in the materials out of which it is constructed. Similarly, a person may organize entities with appropriate properties in such a way as to produce desired outcomes. The purpose of the whole is imposed on its parts and is not reducible to the parts' properties in themselves. Machines are examples. Similarly, strategic organization of parts, as in a wheel or a lever, can contribute to meaningful emergent functions. Hence technological innovations count as examples of moderate emergence. In this type of emergence, open properties or features of physical entities (Polanyi calls them boundary conditions) are utilized by a living being for some higher-level purpose. Polanyi refers to such technological devices as manifesting dual control in which a higher-level purpose relies upon the properties of lower level parts even while in its activism it is independent of control by the lower level. Moderate emergence involves top-down control to achieve purposes that are different in kind from lower level properties.

3. What I am terming *strong emergence* is not necessarily based on either top-down or bottom-up emergence, but arises through some novel form of self-organization. Novel self-organization is not a largely predictable process of maturation or evolution like bottom-up weak emergence. Nor is it essentially functional like top-down moderate emergence. The autopoiesis evident in the emergence of life is one example of the capacity of strong emergence to establish new a new level of order in the world. I view the mind-brain relationship as another example of strong emergence, even though no doubt the human language-infused mind emerged through a number of evolutionary iterations. The hard problem of consciousness acknowledges that a mysterious explanatory gap exists between the firing of neurons and the human experience of consciousness. Strong emergence may be fostered by general principles like the breaking of symmetry or the tendency within the natural world to synchronize. Polanyi follows this line of thinking by suggesting "that the *ordering principle* which *originated* life is the *potentiality* of a stable, open system" (*PK,* 383-384). In any case,

novel self-organization as a complex non-linear process is not strictly governed by pre-existing laws. Rather, it brings into being novel forms of order.

Human experience in Polanyian interpretation offers small scale examples of all three types of emergence. In the process of thinking, many tacit factors, including many of which we are not even aware, are integrated into coherent meaning. The forming of thoughts is a tacitly embodied process, not simply a surface manifestation of logical inference. Thought manifests moderate emergence in that a higher level purpose evokes the requisite tacit parts and processes to support the intended thought or meaning. However, the tacit act of integration forming thought is unlike the conscious control exerted in the construction of a machine and more like a process of self-organization. The act of discovery, experienced as an "ah-hah!", offers an example of crossing a gap between unclarity and newly organized coherence,

Polanyi argues that the existence of emergence in the cosmos leads to the vision of a stratified universe (*TD,* 50). He also suggests that the comprehensive entities created by emergence can be understood as being comprised of higher and lower ontological levels, although at times he wonders if levels are better understood merely in conceptual terms (see *PK,* 394). But is the alternative of either ontology or epistemology really the most fruitful way to construe what is at stake? Let us examine the levels he distinguishes in delivering a speech to see how they might best be understood. He claims there are five levels in the giving of a speech:

> the production (1) of voice, (2) of words, (3) of sentences, (4) of style, and (5) of literary composition. Each of these levels is subject to its own laws, as prescribed (1) by phonetics, (2) by lexicography, (3) by grammar, (4) by stylistics, and (5) by literary criticism. These levels form a hierarchy of comprehensive entities, for the principles of each higher level operate under the control of the next higher level. (*TD*, 35-36)

Clearly no one giving an impromptu speech goes through a process of constructing successively each level as an emergent reality. The process by which the first level emerged occurred in primordial biology; the emergence of the second and third levels would best be determined by anthropologists or linguists, and so on. A person giving a speech would have learned these pre-existing levels formally or informally. This person would begin the speech by attending to the meaning he or she intended to convey. The levels of phonetics, lexicography, etc. seem best regarded as indwelt tacit elements of *meaning* distinguishable through *analysis* rather than ontological levels of a stratified universe or epistemic contributors to knowledge. Ontological parity means that all these levels are real, but intellectual traction is gained only when more precise terminology is used. I believe the contrast between physical reality and meaning, mediated

by embodied understanding, is more robust that the often ambiguous ontology-epistemology distinction. Speech giving is best seen as tacitly involving stratified layers of meaning. Insofar as the content of the speech is emergent, it seems most closely related to moderate emergence in which higher level purpose evokes lower level language.

In conclusion, I believe carefully articulated notions of emergence and due recognition of the importance of meaning analysis offer thinkers opportunities for deep, nuanced understanding of our complex world and its processes. Polanyi understood the importance of meaning (see, for instance, *M,* 178-179), but devoted sustained attention to it too late in life to demonstrate its full significance. He was correct in stating that "the significance of a thing is more important than its tangibility" (*TD,* 33), but he confused matters by saying that significant things like persons and problems are more real than cobblestones. There are degrees of significance but not of reality. Significance is a crucial life-enhancing aspect of meaning. It is in thrall to significance that persons create via moderate emergence the novel meanings and realities that bring ecstatic consummation to life.

References

Bedau, Mark. 2008. "Downward Causation and Autonomy in Weak Emergence." Pp. 155-188 in *Emergence: Contemporary Readings in Philosophy and Science.* Mark Bedau and Paul Humphreys, editors. Cambridge, MA: MIT Press.

Polanyi, Michael and Harry Prosch. 1975. *Meaning.* Chicago: University of Chicago Press.

Polanyi, Michael. *Personal Knowledge.* 1962. Chicago: University of Chicago Press.

_____. *The Tacit Dimension.* 1999 [1966]. With a new foreward by Martya Sen. Chicago: University of Chicago Press.