Emergence — A Response to My Critics

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The author responds to criticisms from the four respondents to his "Emergence, Supervenience, and Personal Knowledge," acknowledging areas where their points have improved the interpretation of science and the interpretation of Polanyi. The discussion focuses on the extent of the "causal decoupling" between parts and emergent wholes, with special attention to the question of whether (and if so, to what degree) brain activity causes thought.

I am grateful to Philip Rolnick, the Guest Editor of this issue, and to the respondents Martinez Hewlitt, Greg Peterson, Andy Sanders and Walter Gulick. The meetings in Denver were as open, as constructive, and as profitable as any session of the AAR I have ever attended; the result of those discussions, and of the written responses above, has been a more nuanced understanding both of the strengths of emergence theory and of the challenges it still faces.

To close a sophisticated debate of this sort with one-liner criticisms of the responses would not do it justice. I wish therefore to indicate substantial agreement with one, to acknowledge the alternate paradigm offered by another, and then to attempt a somewhat more detailed constructive response to concerns raised by the final two. Ideally, the net result of this issue will be a clearer understanding of the emergent structure of the world — one that neither overstates the discontinuities between levels nor understates the significance and uniqueness of the emergentist perspective.

Marty Hewlitt and I are, it appears, in substantial agreement. His final section, "A New Biology Emerging?" nicely expresses our common vision, which in many respects is Polanyi's vision as well. Hewlitt's Figure 2 portrays the integrated levels of emergence, which on our view represent the future of biological studies. We also agree that theories of entelechies or vital forces cannot be part of a scientific understanding today. Even without them, however, the sciences of emergence can trace emergent causal powers wherever they appear in the world.

In contrast to Hewlett, Andy Sanders offers an alternate model to the emergence approach. Influenced by Wittgenstein, he worries about linking the religious life too closely to developments in science. Consequently, Sanders questions my project "for taking the natural sciences too seriously," since the approach may "endanger the autonomy of theology" and "create an unbridgeable gap with ordinary religious meaning" (p. 28). The detailed warnings that Sanders gives merit consideration, since it would seem reasonable that theologians be concerned for the autonomy of their discipline, thus seeking to avoid unnecessary vulnerability to scientific or philosophical criticisms.

But is the degree of vulnerability entailed by emergence really unnecessary? The trouble is, many today no longer find it possible to insulate religion or theology from scientific thinking. For such persons religious beliefs and practices evoke such a level of skepticism — especially when they are cut off from what is known

(and how it's known) in the sciences and philosophy — that religion can no longer function for them as a source of existential meaning and purpose. They may *wish* that it were otherwise; indeed, they might even find themselves jealous of religious persons who can encounter critiques of religion during the week and still comfortably affirm religious truth claims on Saturday or Sunday. But for these persons such separation is not a live option. Either skepticism overtakes them and they refrain from all religious participation; or, at best, they engage in the practices while suspending belief in the truth claims that undergird them.

If such persons are to find the religious meaning that Sanders endorses, they will have to develop a form of belief, and a means of justifying it, that is less distant from science and philosophy, less distinct from the structures of credibility usually applied in those fields. If you can live your religious life with the relative insularity of a Wittgensteinian language game, then more power to you. The emergence argument is meant as a bridge for those of us who no longer can.

Peterson and Gulick are not opposed to allowing the dialogue between theology and the natural sciences to play a key role. Nonetheless, both worry that I grant too strong a place to the neuroscientific account of human thought. Peterson voices his opposition by questioning not only strong but also weak supervenience accounts of thought. His appeal to "open emergence" or "open emergent systems" amounts to the suggestion that human thought be explained in causal discontinuity from the study of the neural correlates of consciousness. In what follows I attempt to show that an emergentist response to the mind-body problem can and must give a larger role to neuroscience than Peterson is willing to countenance.

I am likewise grateful to Walter Gulick for his analysis of emergence in Polanyi's work. With regard to Polanyi, we do not disagree on any matters of substance, and his discussion furthers the task of interpreting Polanyi's groundbreaking work on this topic. Nor does Gulick's detailed account of the three types of emergence — part-whole emergence, transformational emergence, and self-organizing emergence — provide grounds for disagreement; his clear analysis and exposition represent helpful contributions. Once again it is only at the point at which the mind-body relation arises that difficulties emerge; here, I fear, his position is not sufficiently open to the role of the neurosciences in understanding the psychophysical unity that is the human person.

Like Peterson, Gulick worries that my approach to emergence is susceptible "to being undermined by reductive and inappropriately deterministic scientific theories" (p. 32). My view runs the risk of reductivism and determinism because it does not accept a sufficient "causal decoupling" between "the emergent phenomenon and its antecedents" (p. 35). At first Gulick's "causal decoupling" seems primarily to imply an *epistemic* limitation, namely that emergent phenomena cannot be predicted from a knowledge of the causal laws that function on the lower level (*ibid*.). His helpful discussion of "self-organizing emergence," for example, seems to presuppose this less radical interpretation. His discussion draws on the work of Deacon and Goodenough, who clearly maintain that the novelty emerging at later points in evolution is still causally constrained (though not determined) by interactions at lower levels. Is it not this continuing constraint that explains their resistance to "vertical" metaphysics — that is, any metaphysics that seeks to introduce spiritual forces, souls or God — and their decision instead to embrace a metaphysics of "horizontal transcendence"?

Gradually it becomes clear, however, that Gulick's "causal decoupling" is more radical than the idea that there are limitations on our knowledge of how lower levels causally constrain higher levels. At points it even seems that he intends to assert that neural firings do not play a causal role vis-à-vis human thought. He writes,

for example, "I accept the token-token correlation of strong supervenience, but I reject the ascription of causality that normally accompanies discussion of supervenience" (p. 41). This would seem to imply that what happens in one's brain plays *no* causal role in affecting what one thinks. Comparing water molecules to neurons and the behavior of the ocean to thought, he writes, "individual water molecules do not cause all the functions and behaviors of an ocean" (p. 41) and "the water molecules did not independently cause anything; their velocity was caused by wind and wave" (pp. 41f.). Thus, he concludes, "Human causality is uniquely autonomous in the known universe" (p. 43).

But in fact Gulick nowhere actually denies that neurons play a causal role in human thought. Each of the above statements is actually carefully nuanced: water molecules don't cause *all* the ocean's behaviors; water molecules don't *independently* cause anything; human causality is *uniquely* autonomous. Thought may be uniquely autonomous without being *fully* autonomous. Gulick is of course right to nuance his position in this way, for one would certainly not want to deny that brain functioning plays *a* causal role in human thought. If you administer alcohol, Prozac, or a hallucinogenic substance to a subject, you will cause changes in his mental functioning, even though the ingested substance will not determine his precise behavioral responses. (If you administer a sufficient dose of strychnine instead, your action will have an even more radical influence on the subject's thought: it will cause his thought to cease altogether!)

Gulick and I thus both agree that agents at an emergent level exercise a type of causality not reducible to causal forces at the subvenient level — even though the subject's functioning at the emergent level continues to be influenced by the causal forces and structures operating at the subvenient level. Parts influence, indeed sometimes *strongly* influence, the action of wholes. The action of water molecules, for example, contributes to the fracturing of rocks on the ocean's shore. Emergence is not the denial of this (I think obvious) fact; it is the insistence that such facts do not tell the whole story. As Gulick notes, "much *more* explanatory power would come from stating that, say, the fury of a storm ... created the surf that caused erosion at high tide" (p. 41, italics added). Part of the reason that we need emergent explanations — and thus part of the reason that one should accept the doctrine of explanatory non-reducibility — is that emergent wholes *also* exercise real causal powers.

If this analysis is accurate, then one must nunace Gulick's notion of "causal decoupling" in the same way. Perhaps we should speak of a *partial* causal decoupling. However we designate it, the idea is that, while lower levels continue to exercise some causal constraint on emergent levels, they do not determine all behaviors at the higher level; emergent wholes also contribute to the causal story, since they exercise their own, higher-order type of causality.

This short discussion raises the much larger issue: what is it that we mean by "cause" anyway? Clearly, if by causality one means exclusively *efficient causality as studied in the physical sciences*, then one will be hesitant to speak of the influence that two persons exercise on each other, say in the course of engaging in a lengthy philosophical discussion, as a causal influence. But for anyone who is willing to use the term causality in the broader sense of Aristotle's four types of cause (efficient, formal, material, and final), "cause" must mean more than efficient causality, more than the influence that billiard balls exercise on each other when they collide. (Since Gulick obviously has all four of Aristotle's causes in mind [pp. 43f.], it is difficult to understand his squeamishness about using the term causality in this broader sense.) One of the great strengths of emergence theory is its ability to account for the way that more complex types of causality emerge out of less complex orders of causality. Your ideal of a world at peace is one of the causal forces that leads you to exercise leadership in the anti-war movement; and there is no way to relate this type of causality to billiard-ball causality without

understanding the diverse emergent levels that are a byproduct of the evolutionary process.

This is by no means merely a verbal dispute; much turns on preserving the causal constraints that interlink the various levels of the natural world. In the emergence literature, one finds errors on both sides. On the other side, one finds authors who, while paying lip service to the importance of emergence, do not in fact allow it to have any effect on the study of the causes of human or animal behavior. In the original paper, I cited the work of the Stanford neurobiologist William Newsome. Newsome endorses emergence theory, yet he insists that when he is studying perception in higher primates, he proceeds by using "standard reductionist science." If emergence is more than an empty notion, its causal predictions should play a role in the complete explanation of the structures and behaviors of living organisms. In the end, the emergence theory that is really interesting is the one that makes the risky prediction that evolution involves breaks and discontinuities, producing new levels that require new techniques of study, new explanations, and new types of agency.

On the other end of the spectrum, one finds authors who use emergence to immunize humans from scientific study as thoroughly as Cartesian dualism once did. (Certainly this is not Gulick's intention.) The main error of the dualists and vitalists, for example, was to introduce a causal (and ontological!) level that was completely decoupled from the causal system that preceded it in the course of evolution.

The challenge for emergence theorists in the coming years is to avoid both of these extremes. Their work must contribute to progressive research programs in science and must prove crucial to interpreting the results. Perhaps the greatest danger is to appear fearful of or to block advances in scientific knowledge — especially in the area of the neural correlates of consciousness, where the breakthroughs of the next decade or so are likely to be revolutionary. It would be the ultimate irony if theology, long perceived to be fearful of scientific progress, should align itself with emergence theory, only to find that emergentists resist scientific advance as robustly as the theologians once did!

Once again, I am grateful to the four respondents for their probing questions and for contributing new analyses that advance the discussion further than my own contribution could have taken it. Here truly is an example of a whole that is greater than the sum of its parts.

WWW Polanyi Resources

The Polanyi Society has a World Wide Web site at http://www.mwsc.edu/~polanyi/. In addition to information about Polanyi Society membership and meetings, the site contains the following: (1) the history of Polanyi Society publications, including a listing of issues by date and volume with a table of contents for recent issues of *Tradition and Discovery*; (2) a comprehensive listing of *Tradition and Discovery* authors, reviews and reviewers; (3) information on locating early publications; (4) information on *Appraisal* and *Polanyiana*, two sister journals with special interest in Polanyi's thought; (5) the "Guide to the Papers of Michael Polanyi" which provides an orientation to archival material housed in the Department of Special Collections of the University of Chicago Library; (6) photographs of Michael Polanyi; (7) five essays by Michael Polanyi.