Emergence Theory—What Is Its Promise?

EMERGENCE EVERYWHERE?! REFLECTIONS ON PHILIP CLAYTON'S *MIND AND EMERGENCE*

by Antje Jackelén

Abstract. Emergence is a powerful concept marked by great emotional, aesthetic, and intellectual appeal. It makes inroads into the understanding of the most diverse phenomena. Emergence appears to have the potential of explaining anything from the behavior of atoms, ant colonies, and traffic jams to insurance risks, human consciousness, and divine action. Philip Clayton's book *Mind and Emergence* (2004) offers much-needed clarification of the philosophical grounding of emergence theory. To a large extent, emergence hinges on the concept of levels and hierarchies in nature. The preferred metaphor is that of a ladder. Given the tendency of concepts like emergence to build ideology, a careful analysis of language and metaphor is called for, however. I argue that the preference for the ladder metaphor does not do justice to the differentiated relationality that is a distinct mark of emergence. This oversight may have detrimental consequences when emergence theory is transferred from natural to social and cultural processes. A hermeneutical analysis suggests that better metaphors and visualizations need to be found. As an invitation to consider alternatives, some examples of complex regular polytopes are offered.

Keywords: Philip Clayton; complex regular polytope; complexity; differentiated relationality; emergence; hermeneutics; hierarchy; metaphor; religious naturalism; theism.

I like emergence, and I do so for several reasons. The concept of emergence has promising epistemological qualities; by endorsing a maximal

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methodological naturalism while preserving a maximum of openness, it offers an impressive explanatory potential. Intuitively, it has a positive feel to it: Emergence comes with a flavor of spontaneity, novelty, surprise, and excitement. It suggests that there is more to life than austere determinism and strict probability. If emergence sets the tone of life, there is hope for frustrated late-midlifers who feel the threat of the "that-was-it" summary of their biographies. Emergence has a pleasant and attractive appeal, because it keeps novelty and predictability in balance—enough surprise to keep boredom away and enough orderliness to keep chaos at bay. Moreover, emergence seems to suggest equal respect for minor and major parts of systems, because significant things can emerge from insignificant starts, and in the end the whole is so much more than the initial components; there is "*something more* from *nothing but*" (Goodenough and Deacon 2003, 802). These days, the word *emergence* resonates well with theoretical and practical thought in many different areas. It is used in reference to processes in nature, politics, economics, social life, and our individual minds. No doubt, there is some justification for the exclamation mark in the title of this essay: "Emergence Everywhere!"

Nevertheless, there also looms a suspicion behind this title, indicated by the question mark: "Emergence Everywhere?" It is the suspicion that emergence might well be overrated as a concept. Emergence could be a buzz word with enormous pretensions—claiming the ability to explain almost everything from the behavior of atoms, ant colonies, and traffic jams to insurance risks, human consciousness, and divine action. Is emergence the magic wand that finally brings about the great unified understanding of it all? Or, I ask, not without self-irony, is it merely a fad that, already abandoned by physicists, finally starts to excite the theologians?

In my earlier work on the role of hermeneutics in religion-and-science I have discussed the potential of scientific concepts to build ideology (Jackelén 2004). Albert Einstein was quite unhappy with the ideological use that was made of relativity. Quantum physicists have had reason to complain about the ideological exploitation of the uncertainty principle and the measurement problem. Like relativity, complementarity, and complexity, emergence seems to be yet another example of concepts that absorb meaning from different contexts of inquiry, transfer such meaning from one context to another, and thus develop the capacity of building ideology. Emergence theorists may wish to pay attention to such dynamics. They may as well be concerned about the effects of their concepts far from their origin.

Varieties of Emergence

It is in this regard that Philip Clayton's book *Mind and Emergence* (2004) brings helpful clarity. He is aware of the risks of launching emergence as a "magic pill" (p. 47), and he effectively counteracts any suspicion of faddishness by firmly lodging emergence in the realm of philosophy. He traces

its history back to 1875, describing its use in the work of the British emergentists through a period of oblivion between 1930 and 1960 to its reappearance in the work of Michael Polanyi and Roger Sperry. It is hard to resist the appeal of Clayton's approach: Emergence allows us to declare victory over reductionism and to tread the golden path between physicalism and dualism! This sounds like the perfect solution to the debates that have troubled philosophers, scientists, and theologians for so long.

As the argument in Clayton's book unfolds, one realizes, as always in the academic enterprise, that things are not that simple. There are at least three considerations that complicate this solution. First, *methodological* reductionism remains a powerful tool in seeking and structuring knowledge, even when *metaphysical* reductionism has been repudiated. Second, the edges that distinguish the path of emergence from the ditches of all kinds of physicalism and dualism may be softer and fuzzier than we hope. After all, the spectrum of those who prioritize the theoretical framework of physics at the expense of recognizing human cognition as a distinct explanatory category—that is, physicalists—and those who overemphasize the distinctiveness of this same faculty by drawing a dividing line between mind and matter—that is, dualists—is a broad one. Finally, emergence is not just one path but at least three. Clayton distinguishes between *façon de parler* emergence, which is merely disguised physicalism and therefore in fact a *cul de sac*; weak emergence, which attributes to emergence epistemological significance only; and strong emergence, with its ontological assumption of active downward causation bringing about not only quantitative but also qualitative increase of complexity.

The concept of downward causation in emergence deserves a separate discussion because of the implicit opposition between active causation and spontaneous emergence. It is not directly clear how downward causation can be intrinsic to emergent processes; rather, downward causation—although defined as a "non-additive causal influence" (p. 49) of a whole on its parts—seems to add something external to the process. An emphasis on bottom-up sources of development instead gives the immediate impression of being more congenial to emergence than downward causation. In fact, without downward causation, emergence looks "democratic" in a way that balances the hierarchical dimensions of emergence in interesting ways—for example, in terms of insignificant elements giving rise to something very significant. However, such a discussion transcends the scope of this essay.

Even with the roadmap of three different types of emergence, the terrain remains cluttered. For example, both Ursula Goodenough and Terrence Deacon on the one hand and Philip Clayton on the other argue for strong forms of emergence; yet, there is a fundamental difference. Goodenough and Deacon use emergence in order to argue that everything is perfectly intelligible within a naturalist framework, thus making any theist

notion superfluous (Goodenough and Deacon 2003; Goodenough 2005). Their view of emergence appears to be lodged in an enclosed, dynamic system of naturalism. Clayton, on the contrary, ends up using emergence precisely to break such a naturalist system open by exploring how emergence may suggest transcendence. In his proposal, the highest step on the ladder of levels of emergence is reserved for transcendence. Nature is not self-enclosed but is upwardly open to divine influence on various parts of the natural world (2004, 193). This is a significant difference.

Emergence and God

By taking the path he does, Clayton positions himself between the extremes of religious naturalism and abstract theism. As a result, his approach triggers critique from both sides.

For religious naturalists, Clayton's approach to emergence and transcendence may, in spite of considerable differences, look like a variation of Thomas Aquinas's five ways of proving the existence of God: regardless of whether one looks at motion, causes and effects, contingency, values, or purpose, all threads are "proven" to run together in one point at the supreme level. It is merely the direction that has changed. Where Thomas emphasized God as the origin and source of everything—top-down, as it were—Clayton's discourse prefers the bottom-up direction. Regardless of direction, we are left with a God residing at the top of the ladder or pyramid. Many recent voices in theology have argued against such an idea of God. The solitary confinement of God to the top level would clearly be in dissonance with much of contemporary theology. It would also be in disagreement with the relationality that resides at the core of emergence theory.

For abstract theists, the same approach is likely to be critiqued for opposite reasons: Clayton's transcendence of God appears too enmeshed within the multiple levels of emergence in the natural world. If God is envisioned in terms of a continuum from physics, via chemistry, biochemistry, biology, and consciousness to the divine, there appears to be too much of the same and too little of a radical difference between God and the world. Is not this God stripped of divine power and divine alterity? Is Clayton's God merely a Feuerbachian God emerging from the world, or is it just a Schleiermachian consciousness of God that is emerging here?

Clayton makes himself vulnerable to critique from both sides, which I see as a strength rather than a weakness. In my view, this inevitable yet brave exposure contributes greatly to the appeal of his book. Bringing together both immanent and transcendent divine creativity is bound to generate uneasiness in various camps. There is a cost to walking the tightrope of the double commitment to maximal empirical testability and metaphysical minimalism. In one way or another, this is the price that cannot be avoided in religion-and-science. Many of us who are engaged in this

field on the side of philosophy and theology are well acquainted with the ongoing tug between the strongest possible commitment to naturalistic explanation, an equally strong commitment to scrutinizing metaphysical assumptions, and the desire to negotiate the rightful roles of both in the pursuit of truth. This is not always a comfortable position but is the only possible one for a fruitful interaction between science and religion. The alternatives—ignoring the role of metaphysical assumptions in intellectual endeavors (as many scientists have been trained to do in regard to science) and disregarding the potential of naturalistic explanations (as religionists often have been educated to do)—are deficient strategies.

This being said, it seems important to take a look at how emergence is being described before attempting to assess the theological implications of emergence talk.

Loops or Ladders?

In a one-sentence definition Clayton describes emergence as "*the theory that cosmic evolution repeatedly includes unpredictable, irreducible, and novel appearances*" (2004, 39). Moreover, emergence is "a repeating pattern that connects the various levels of evolution in the cosmos" (p. 49), and it does so without external intervention. Emergence theory would never allow for a *deus ex machina*. According to these definitions, emergence carries the seed of evolving into a metascientific theory: The farther one steps back, the more one gains an overview of the patterns that run through all known levels. Seen through the lens of emergence, a ladderlike view of the world takes shape: physics, chemistry, biochemistry, biology, consciousness, transcendence. And were there such a thing as a true Archimedean point, I think Clayton's philosophical acuity would be able to identify it; then, a straight line could be drawn from microphysics to transcendence, and a noncontroversial argument could be crafted in favor of downward causation. In other words, what takes shape in this book is not only an argument but also a vision that has the power to fill the reader with enthusiasm. The linear structure seems fascinating.

A closer look reveals that the focus on linearity can be deceiving. The words *ladder*, *level*, and *hierarchy* are strikingly central to all emergence talk I have heard so far. Clayton's book is no exception in this regard. Texts on complexity and emergence routinely speak of levels and hierarchies. It seems, however, that Clayton's philosophical approach, with its focus on upward and downward causation and on the question of supervenience, including all the scholastic sophistication that has gone into its debate, intensifies the role of hierarchies in the discourse. Clayton hinges his whole argument on the notion of hierarchy. The emergentist monism he argues for is correct "if . . . natural history produces entities that evidence a range of *hierarchically* ordered emergent qualities" (p. 128; emphasis added), which is why the ladder metaphor seems justified and full of meaning.

However, when I look at the illustrations accompanying Clayton's chapter on emergence in the natural sciences (pp. 65–106), it strikes me that they look very unlike ladders. Many of these illustrations are horizontal and circular rather than vertically oriented. There are more loops than ladders, as it were. For example, there is a beautiful diagram on nested hierarchies in biological systems with four sets of circles embedded in each other (p. 84). I regret that Clayton grants the nested hierarchies less than eleven lines (pp. 83–84), which comes across as a rather scanty treatment of an important feature of emergence. This disparity between words and illustrations suggests a disconnect between the scientific data that seem to speak more of interrelatedness and Clayton's philosophical approach that favors the up-and-down at the expense of a concept of what I like to call *differentiated relationality*. In Clayton's text, the loops are submerged by the ladder. Nevertheless, there also exists a subtext of relationality that is worth bringing up to the light. It seems that the sciences have done that more forcefully than the philosophy Clayton draws upon. Genetics, neuroscience, and ecology are among the sciences that most stringently have drawn attention to issues of relatedness.

Horizontal relationships are part and parcel of emergence talk. The neat distinction of levels and hierarchies is paralleled by a horizontal blending of categories in emergence thought. The vertical arrangement of levels is not the whole truth. There are also "flat" relationships between dependence and distinctness, recurrence and novelty, something being "more than" yet not "altogether other than," and a blurring of the border between merely quantitative and qualitative change.

When emergent behavior in complex biological or ecological systems is being visualized, the diagrams look very similar to graphs depicting social relationships between individuals or groups of people (for example, Clayton's figures 3.8 and 3.9, pp. 82 and 83, on local-global interactions and complex ecosystems). If emergence has useful explanatory potential over the whole range from molecules to consciousness, we should anticipate its transfer into the realm of social and intellectual relationships. Descriptions in terms of self-organization and emergence of such diverse things as the development of suburbs, traffic jams, and the Wikipedia on the Internet exemplify these trends: Complexity and emergence are being used to define new approaches not only to natural processes but also to social and cultural processes.

The emergence of new order and structure in nature and society is explained by physical, chemical, biological, social, and economic self-organization, according to the laws of nonlinear dynamics, states the editorial description of Klaus Mainzer's recent book *Symmetry and Complexity*, which comes with the suggestive subtitle *The Spirit and Beauty of Nonlinear Science* (2005). Mainzer, a philosopher of science, suggests that symmetry and complexity are not only useful models of science but also universals of

reality: "in the beginning there was a dynamical symmetry expanding to the complex diversity of broken symmetries" (2005, 23), which leads to the emergence of new phenomena on all levels from atoms to art. He understands emergence in terms of phase transitions. On the basis of the analysis of these transitions Mainzer argues that in order to meet the challenges of globalization "we should deregulate and support self-regulating autonomy," because the "sociodiversity of people is the human capital for a sustainable progress . . . in the evolutionary process of globalization" (2005, 272). Mainzer derives social and political norms directly from the scientific and philosophical study of emergence.

These examples illustrate my point that emergence is a concept that migrates freely between very different areas of life and knowledge, thereby easily crossing the borderlines between descriptive and normative statements. Precisely because this is the case, what is called for here is a careful analysis of the language and metaphors associated with emergence talk.

Hierarchy in Emergence Theory: Promise and Problem

It is in this perspective that the role of hierarchy in emergence theory becomes more than an academic question. Is there a "hierarchic logic of emergence" (see Deacon 2003)? If the concept of hierarchy is absolutely crucial to emergence, it will also be absolutely crucial when emergence is applied to social phenomena and social networks. This will lead to the risk of inadvertently promoting hierarchical views of society. Submerged groups in society will potentially then have nothing good to hope for from emergence. Ironically, then, emergence, while pondering causation and self-organizing agency, may serve to keep those in need of emerging into better lives without real options of causation and agency. One needs to add that the prominent place hierarchies and ladders tend to occupy in emergence appears to be in glaring contrast to significant strands in the human sciences and in theology, which often are highly critical of simple hierarchical models. Hence, I see a second disconnect here, this time between a central metaphor and data from other social and life sciences.

Is this a leap in category from science and philosophy to sociology and theology? Yes, it is. But emergence is all about trying to understand leaps. In this respect the ladder image is indeed adequate. Nature is grainy and makes jumps; to that extent, talk of hierarchies is valid. But nature is also interconnected in ways we do not fully understand, and that is where hierarchies and the ladder metaphor do not seem to be enough. In fact, I argue that in the end the ladder metaphor is disingenuous and misleading. It suggests a neat and regular sequence of steps leading upward. It cannot adequately account for the phenomenon that new, locally stable entities emerge in a web of differentiated relationality rather than in a linear sequence of hierarchies.

I am always impressed with the outstanding quality and the abstract beauty of Clayton's arguments. Nevertheless, I argue that the hierarchy issue deserves more attention than it is granted in *Mind and Emergence*. It is not that alternatives are totally absent: On one hand, Clayton exclaims "Gone is the mono-linear causal story . . ." and celebrates the "multi-levelled network of interdependency" of natural systems (pp. 88–89). In the end, however, hierarchy wins over the relational web, for, on the other hand, he exalts the concept of hierarchy into the dimension of ultimate meaning. In talking about "the hierarchy of meaning" he states (similar to Abraham Maslow's hierarchy of needs): "When basic physical, emotional, and social needs are met, humans invariably raise questions of the 'ultimate meaning of it all'" (p. 192). I wonder: What is it that gives the quest for ultimate meaning articulated by, for instance, satisfied academics a higher place in the hierarchy than the cry for meaning out of the depths uttered by a person in great need? A comparison with the message of *De profundis*, "Out of the depths I cry to you . . ." (Psalm 130:1), suggests a third disconnect—this time to theological data.

From Ladders to Polytopes

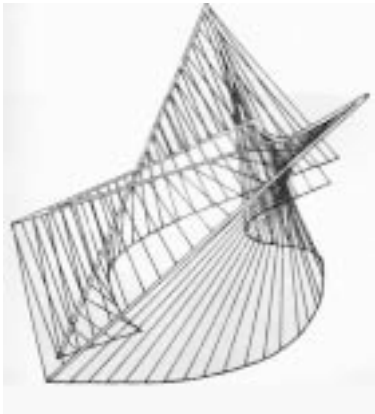
Why do Clayton and others with him choose the ladder as the central metaphor in emergence? To some, raising this question may sound like discussing adiaphora: It is just a metaphor, and metaphors belong to the realm of trivia. But no—metaphors matter, because they work. They function. They have the power to shape thinking and reality beyond mere description. Mental images influence interpretation and application of ideas. Therefore the question of levels and ladders remains crucial. I have argued that levels and ladders cannot give an apposite account of the network aspect of emergence. Isn't what is observed more like a tapestry than a ladder?

I suspect that the time has come to acknowledge the limitations of grid-structures such as ladders. It is time to look for more complex images that provide more adequate ways of expressing both the distinctiveness of levels *and* their interrelatedness—images that can express differentiated relationality, as I have called it.

If emergence shows up almost everywhere, and if emergence has something important to tell us about how the world works, it is indeed of vital importance that we get our language, images, and models of emergence correct. There is a need for metaphors and visualizations that are superior to ladders in expressing the interplay of continuity and discontinuity, of relatedness and distinctness. Such visualizations should combine the message of both levels and loops. This both-and is important. I have certainly argued in favor of a critical reassessment of the role attributed to hierarchies. This critique, however, should not be misunderstood as an attempt to deny hierarchies altogether. In nature, as in classrooms, workplaces,

and between nations, hierarchies exist, but they need to be questioned, negotiated, and renegotiated. I do believe that a critical rethinking of the hierarchical terms does not invalidate Clayton's insight that "the distinctiveness of the emergentist thesis lies in its claim that the natural world exhibits a variety of levels at which distinct types of laws and causes can be recognized" (p. 107). But what we encounter is more a both-and and less an either-or. Emergence suggests differentiated relationality rather than a straight ladder from physics to God.

Let me therefore finally suggest that complex regular polytopes[1] (illustrations 1–3) are examples of more satisfying visualizations. They may give us a more adequate image of emergence than grids or ladders do. Polytopes are clearly not able to describe the fullness of emergence either; there always remains a surplus that even the most sophisticated visualizations cannot express. Especially do they run the risk of nurturing the illusion that emergence can be neatly conceptualized or boxed, which would



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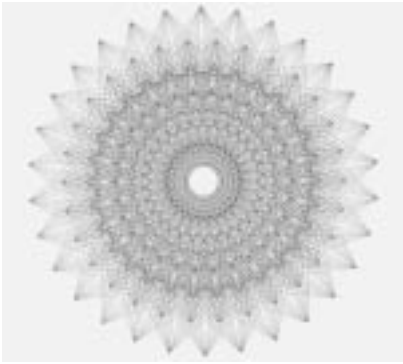

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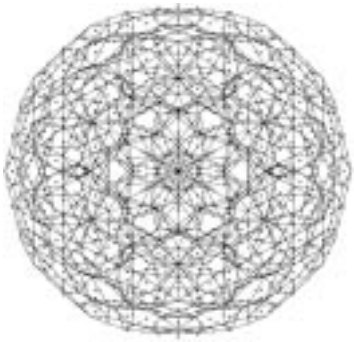

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defy the central claim of emergence that it is about novelty! Nonetheless, contemplating polytopes as illustrations of emergence may inspire more adequate metaphors than ladders for the emergent world Clayton shows us in *Mind and Emergence*.

NOTES

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1. I thank Paul Heltne for first drawing my attention to complex regular polytopes.

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