

EMERGENCE: A NEW APPROACH TO THE PERENNIAL PROBLEM OF THE ONE AND THE MANY

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ABSTRACT

Emergence, as a relatively new concept in the natural and social sciences, has multiple meanings. As an analogical philosophical concept which consciously resists the dialectical opposition of reductive physicalism and immaterial dualism for the understanding of physical reality, it presupposes an evolutionary world view which is open-ended in its mode of operation rather than conceptually closed. Within such an open-ended world view, the implicit paradigm for the dialectical relationship between the One and the Many will necessarily be different from the corresponding paradigm for that relation within a closed metaphysical system. The purpose of this article is to set forth an understanding of the relation between the One and the Many that rationally justifies an open-ended, process-oriented metaphysics which in turn confirms the proposed validity of that same paradigm for the understanding of physical reality from an evolutionary perspective. Hence, I first lay out the historical development of the classical paradigm for the One and the Many in Western philosophy and at the same time point to its residual deficiencies for a full explanation of physical reality. Then I sketch what I see as a new paradigm for understanding the relation between the One and the Many which does not prioritize either the One over the Many or the Many over the One but sees them as intrinsically interdependent for their existence and intelligibility. Finally, I apply this revised understanding of the relation between the One and the Many to analysis of the generic notion of emergence in the natural sciences. Further application of this new paradigm for the relation between the One and the Many within each of the natural sciences and within the social sciences and the humanities will inevitably involve many other individuals than the author.

KEY WORDS: Plato, Aristotle, Thomas Aquinas, René Descartes, Immanuel Kant, Niklas Luhmann, Alfred North Whitehead, Colin Gunton, Stuart Kauffman.

1. INTRODUCTION

The notion of emergence has become a key concept in the natural sciences, especially biology, in recent years (Clayton 2004, 1-37). As a result, it has multiple meanings (Morowitz 2002, 25-38). But all are basically derived from an approach to physical reality which resists the dialectical opposition of reductive physicalism and immaterial dualism as ultimate explanation of the cosmic process. Thus emergence is not a univocal but an analogical concept; it is, in other words, more a generic philosophical rather than a strictly defined scientific concept. But, if it is likewise a philosophical concept, then it presupposes an underlying philosophical world view which puts more emphasis on Becoming than on Being, in other words, a world view that is radically open-ended rather than conceptually closed. Within such an open-ended world view, the implicit paradigm for the dialectical relation between the One and the Many will necessarily be different from the paradigm for the One and the Many within a closed metaphysical system. The purpose of this article is to set forth an understanding of the relation between the One and the Many which rationally justifies an open-ended, process-oriented metaphysics even as that metaphysics in turn confirms the provisional validity of this new understanding of the relation between the One and the Many for an evolutionary approach to reality. Hence, I will first lay out the historical development of the classical paradigm for the One and the Many in Western philosophy and indicate its inevitable deficiencies for contemporary understanding of reality. Then I will lay out in detail what I see as a new paradigm for understanding this relation between the One and the Many which does not prioritize either the One over the Many or the Many over the One but sees them as intrinsically interdependent for their existence and intelligibility. Finally, I will apply this revised understanding of the One and the Many to analysis of the generic notion of emergence in contemporary natural science.

2. THE CLASSICAL PARADIGM FOR THE ONE AND THE MANY

Heraclitus and Parmenides were two of the more prominent Pre-Socratic Greek philosophers in the late sixth and early fifth centuries BCE. Their world views were strikingly different from one another. "Heraclitus is the philosopher of plurality and motion: the many are prior to the one, and in such a way that there is to be found in nature no stability" (Gunton 1993, 17-18). Parmenides held the opposite position: "Reality is timelessly and uniformly what it is, so that Parmenides is the philosopher of the One *par excellence*. The many do not really exist, except it be as functions of the One" (Gunton 1993, 18). Plato in his philosophy favored the view of Parmenides on the unchanging reality of the One but recognized that common sense experience of physical reality gives priority to the empirical Many over the non-empirical One. His compromise in Books Six and Seven of *The Republic* (Plato 1962, 509D-511B; 514A-521B) was to distinguish between two levels of physical reality that are interconnected and inter-dependent: the empirical world and the world of ideas. The empirical world is characterized by ongoing change; the world of ideas is radically unchanging. Thus was born the idea of transcendent forms which in their empirical self-manifestation give order and intelligibility to the world of common sense experience. The One in terms of these a priori forms (especially the Form of the Good) thus enjoys ontological priority over the empirical Many even though only the two in ongoing combination fully explain the nature of physical reality.

Aristotle was uncomfortable with the Platonic notion of transcendent forms and thus introduced the theory of substantial forms which gave material realities their enduring self-identity by being the internal rather than the external principle of their order and intelligibility (Aristotle 1979, 1037a6-7). But the substantial form only represents what the individual material thing has in common with other similarly constituted material things; it abstracts from the entity in its particularity as somehow different from other material things with the same substantial form or internal principle of order and intelligibility. Humanity, for example, as a generic substantial form does not specify how an individual human being is different from other human beings. The particular "thisness" of the individual human being somehow remains beyond rational comprehension (Aristotle 1979, 1039b20-1040a8). Hence, even though Aristotle was much more aware of the importance of individual material things than Plato, he had to distinguish between substance as unchanging form or essence and accidents which as changing contingent realities further specify how one human being is different from another human being. Hence, he too in his own way adopted Plato's understanding of the relation between the One and the Many whereby the One is transcendent of the Many as their principle of order and intelligibility.

In the medieval period of Western civilization, Thomas Aquinas stands out as the theologian who most successfully revised Aristotelian metaphysics so as to use it as the metaphysical underpinning for his *Summa Theologiae* (Aquinas 1947) and other works. In particular, he adopted Aristotle's four-fold causal scheme for his understanding of the God-world relationship:

"Aristotle believed that in order to understand any individual thing we must know four aspects of it, each of which operates to determine its nature. We must know (1) the material out of which it is composed (the material cause); (2) the motion or action that began it (the efficient cause); (3) the function or purpose for which it exists (the final cause); and (4) the form it actualizes and by which it fulfils its purpose (the formal cause) [Jones 1969, 141]."

Within Aquinas' metaphysical scheme, of course, the God of Biblical revelation replaces Aristotle's notion of the Unmoved Mover as the First or Uncaused Cause of the existence and activity of the universe. But, for the purposes of this essay, it is enough to note that Aquinas thereby implicitly also subscribed to the Platonic understanding of the One as a transcendent entity which gives order and intelligibility to the Many (all the finite entities of this world). God as such is transcendent to the cosmic process but is the ultimate reason why finite entities exist and how they are related to one another in terms of a final goal, God's intention in the act of creation.

In the early modern period of Western philosophy, René Descartes initiated an empirically oriented "turn to the subject" both in metaphysics or ontology and in the new philosophical discipline of epistemology (Bracken 2009, 24-37). That is, he "did not begin by proving the existence of God from his experience of causality in the world around him. . . .He began by questioning the veracity of his own experience of himself as seeking the truth. Even if 'God' proved to be a demon bent on deceiving him at every turn, Descartes could not doubt or call into question his own existence as someone here and now doubting everything else" (Bracken 2009, 28; Descartes 1978, 1: 150). This turn by Descartes to the individual human subject of experience as necessary starting-point

for a systematic understanding of self, world and God was doubtless heavily influenced by the unexpected growth of natural science at the same time with its governing methodology of hypothesis/verification for exploration of the laws governing the natural world. On the one hand, early modern natural science was thus oriented to careful observation of the way things actually work (as opposed to the way in which they should work in terms of their alleged substantial form or essence as in the ancient and medieval mind). But, on the other hand, that same methodology insofar as it aimed at the formulation of mathematical laws to govern the empirical world inevitably moved away from immediate sense knowledge to another level of abstraction, no longer the world of transcendent forms but now the world of mathematical relations between physical realities viewed simply in terms of their quantitative dimensions. Even so, the classical paradigm for the relation between the One and the Many remained in force. The One was no longer the God of Biblical revelation or the Unmoved Mover of Aristotelian metaphysics, but rather the individual human subject of experience as somehow transcendent of its own thoughts and feelings.

The Cartesian turn to the subject has continued to influence Western philosophy to the present day. In the hands of Emmanuel Kant, to be sure, it received a new configuration. As the successor to John Locke in the tradition of early modern English empiricism, David Hume had argued that a careful examination of the contents of human sensory experience revealed no empirical evidence of a human subject of experience as the internal principle of order and intelligibility for the thoughts and feelings flowing through consciousness from moment to moment: "From the mere repetition of any past impression, even to infinity, there never will arise any new original idea, such as that of a necessary connexion' or ontological principle of causality" (Hume 1967, 88; Bracken 2009, 44). Hume, accordingly, claimed that perhaps there was no interior self to serve as the (relatively) transcendent One vis-à-vis the Many ("impressions") of sense experience. Rather, the belief in an enduring self presiding over the changing contents of consciousness is due to the power of the human imagination to conjoin separate ideas within the mind that are regularly found together in sense experience. The sense of the self as an enduring reality is thus simply a product of association of ideas without further grounding in human nature.

Kant saw the disastrous consequences of Hume's effective repudiation of the objective self and the principle of cause-and-effect in human experience and devised an ingenious counter-argument. Calling it a second Copernican revolution in human understanding of objective reality. Kant claimed that, following the methodology already in use in contemporary mathematics and natural science, "reason has insight only into that which it produces after a plan of its own" (Kant 1956, 22 [B xvii]). So the objectivity of the laws of nature are not to be found in extra-mental reality but in careful study of the unvarying workings of the human mind. The mind, in other words, imposes its internal principles of order and intelligibility upon the "phenomena" of sensory experience from moment to moment. Kant's presupposition here, of course, was that the human mind worked the same way in all human beings, regardless of their different cultural backgrounds and personal history. In the centuries after Kant's *Critique of Pure Reason*, of course, this Kantian presupposition of the universality of the workings of the human mind has been empirically proven to be incorrect. As a result, movements like contemporary postmodernism with its emphasis on the reality of the empirical Many, the radical particularity of all physical and mental entities vis-à-vis one another, have flourished in academe to the extent that talk of the One as an intelligible principle of order and intelligibility for the Many in human discourse is immediately called into question as "thinly disguised attempts to control the interpretation of historical events in one's own favor" (Bracken 2012, 67). "Meta-narrative," a comprehensive overview of human history, is thus ultimately illusory; all historical narratives are radically subjective and thus necessarily different from one another in perspective (Lyotard 1984, xxiii-xxiv).

Yet, contrary to the misgivings of postmodern thinkers about the evils of "totalizing systems," some form of systematically organized thought is indispensable for serious research and publication in the natural and social sciences. Hence, it is not surprising that various forms of systems theory have arisen to fill the gap created by postmodernists and others who focus on subjectivity and particularity to the virtual exclusion of objectivity and universality. Systems theory, on the contrary, focuses on rule-governed events in the natural order rather than on the human and nonhuman agents at work in that context. Yet there is a danger in thus emphasizing objectivity to the virtual exclusion of subjectivity. The well-known systems thinker Niklas Luhmann seems to be guilty of that mistake in his widely read book *Social Systems* (Luhmann 1995). Hence, I will first summarize and critique his argument for totally objective thinking before setting forth my own middle-ground position of open-ended (as opposed to conceptually closed) systems, especially as exemplified in Whiteheadian structured societies.

Luhmann's emphasis in *Social Systems* is on what he calls self-referential systems, namely, "systems that have the ability to establish relations with themselves and to differentiate those relations from relations with their environment" (Luhmann 1995, 13). Moreover, internal relations between and among entities within the system are more important than relations with entities in the environment. Yet these self-referential systems are strictly "nonpsychic" (Luhmann 1995, 14). Their components are simply "elements" with objective relations to one another in virtue of the structure of the system (Luhmann 1995, 20-23). Somewhat paradoxically, then "systems must create and deploy a description of themselves; they must be able to use the difference between system and environment within themselves, for orientation and as a principle for creating information" (Luhmann 1995, 93). There are, to be sure, within Luhmann's scheme so-called psychic systems but only insofar as they are different from other kinds of systems (e.g., physical organisms, machines, communities or organizations). Human consciousness, for example, is a psychic system insofar as it is an "observer" of other self-referential systems within its environment (Luhmann 1995, 9; 16-17). So, while these other self-referential systems somehow "create and deploy a description of themselves . . . for orientation and as a principle for creating information," they are not psychic systems since they do not "observe" one another after the fashion of human consciousness as a psychic system.

In his book *Luhmann Explained*, Hans Georg Moeller makes clear that Luhmann does not deny the de facto reality of human beings but only affirms that human beings exist on several levels at once ((bodily, mentally, and socially) and that each of these levels is in its own way a self-referential system. Moreover, these levels do not make up an organic whole, a complete human being (Moeller 2006, 10). For that matter, reality as such "is not an all-embracing whole of many parts, it is rather a variety of self-producing systemic realities, each of which forms the environment of all the others" (Moeller 2006, 14). Each of these self-producing realities is a product of *autopoiesis*, a term which Luhmann borrowed from Humberto Maturana and Francisco Varela, two biologists from Chile who applied systems theory to the study of biological reproduction, the way in which living cells from moment to moment are the product of their internal processes of reproduction (Moeller 2006, 12-13). Living cells, however, like other physical organisms big and small, undergo *autopoiesis*, a systematically organized process of reproduction, only because in the first place their component molecules are sufficiently aware of other molecules around them so as to combine in such a way as to produce the higher-order reality of a cell (Kauffman 1995, 47; Bracken 2012, 36-38). Not every combination of molecules, in other words, produces the reality of a cell; some combinations lack the requisite internal order among their component molecules and eventually disperse. Hence, even though life in the strict sense first originates at the cellular level, some sort of unconscious inter-subjectivity or mutual awareness would seem to be already present in the atoms and molecules composing the cell.

So general systems theory as articulated by Niklas Luhmann gains pure objectivity at seemingly too high a price. Admittedly, it offers a common methodology for analysis of otherwise loosely related scientific disciplines. But it fails to show any deeper interconnection among them so that they together constitute components or parts of a unified whole. My own counter-argument would be that both postmodernists with their emphasis on radical particularity and systems thinkers like Luhmann with their ideal of pure objectivity do their thinking within the parameters of the classical paradigm for the relation of the One and the Many. That is, in different ways they both emphasize the reality of the Many to the virtual exclusion of any notion of the intelligible One as their principle of order and intelligibility. They reject this notion of the One as necessary counterpart to the Many because it entails the existence of a transcendent entity or principle of order and intelligibility which cannot be empirically verified. But while that characterizes the notion of the One within the classical metaphysics of Being set forth originally by Plato and Aristotle and then carried forward by medieval and early modern thinkers (as noted above), it does not preclude the possibility of a new understanding of the One as emergent out of the dynamic interplay of the Many from moment to moment.

Yet, if this is the case, then the One is no longer an individual entity transcendent of the empirical Many but the byproduct of the dynamic interrelationship of the empirical Many with one another, a new corporate reality which in turn informs the way in which the Many then relate to one another as its component parts or members. As I will make clear in the second part of this article, it is best understood as an ongoing structured field of activity which comes into being and continues to exist only in virtue of the dynamic interplay of its constituent parts or members (the empirical Many) with one another. Yet, as the lawlike environment or context for the interrelated activity of the Many, it constrains the way in which they as its component parts or members interact with one another. In this sense, then, the One and the Many are ontologically interdependent; neither can exist without the other. Finally, given this new more dynamic understanding of the relation between the One and the

Many, it will be relatively easy to offer a generalized explanation for the notion of emergence within the natural sciences. My guide for this second part of the article will be the metaphysical scheme of Alfred North Whitehead as laid out in his master work *Process and Reality*, albeit with certain necessary revisions to his key category of “society” (Whitehead 1978, 34-35).

3. THE NEW PARADIGM FOR THE ONE AND THE MANY

Whitehead was a distinguished mathematician and theoretical physicist before he turned his attention to the philosophy of nature or philosophical cosmology. As he makes clear in one of his early books on this subject, *Science and the Modern World*, he had become disenchanted with a purely quantitative or mathematical approach to the analysis of physical reality. In the chapter entitled “The Century of Genius,” for example, he first notes that contemporary natural science routinely presupposes that “the world is a succession of instantaneous configurations of matter” (Whitehead 1967a, 50) but then adds that it thereby falls prey to the fallacy of simple location: “material can be said to be *here* in space and *here* in time, or *here* in space-time, in a perfectly definite sense which does not require for its explanation any reference to other regions of space-time” (Whitehead 1967a, 49). In his view, physical reality is thereby reduced to the workings of a cosmic machine since its component parts, material atoms, have no internal but only external relations to one another. As a result, “there is nothing in the present fact which inherently refers either to the past or the future” (Whitehead 1967a, 51). Yet nature is evidently an evolutionary reality with a well-defined past and a predictable future, both of which enter into the intelligibility of the present moment. Hence, early modern scientific method is based on a conscious (or more often unconscious) abstraction from physical reality as it really is. Whitehead calls this “the fallacy of misplaced concreteness” (Whitehead 1967a, 52).

Still another example of the fallacy of misplaced concreteness operative in current scientific method is the notion of substance as the ontological substratum of which we predicate qualities: “Some of the qualities are essential, so that apart from them the entity would not be itself; while other qualities are accidental and changeable” (Whitehead 1967a, 52). Earlier in the 17th century René Descartes and John Locke had set forth the distinction between primary and secondary qualities. The primary qualities (like size, shape, mass) are quantitative and mathematically measureable; the secondary qualities are qualitative and non-measureable (colors, sounds, smells). Hence, modern scientific method with its exclusive focus on the exact measurement of primary qualities falls victim once again to the fallacy of misplaced concreteness, mistaking the quantitative dimensions of physical reality for reality as a whole. Yet, in Whitehead’s mind, reality is very much alive in its spontaneous activity and thus is somewhat unpredictable, based on probabilities rather than rather than purely mechanical natural laws.

Whitehead’s solution to this metaphysical impasse, which he eventually set forth in his master work *Process and Reality*, can be summed up in three key presuppositions. The first is that “‘actual entities’—also termed ‘actual occasions’—are the final real things of which the world is made up” (Whitehead 1978, 18). An actual entity/actual occasion is a momentary self-constituting subject of experience which is internally related at every moment to still other self-constituting subjects of experience in its immediate environment. The second presupposition is that Ultimate Reality is not a transcendent entity (not even God) but a transcendent activity which is active in the self-constitution of actual entities (even in God as the non-temporal or transcendent entity). As such, it is the principle of novelty whereby “[t]he many become one and are increased by one. In their natures, entities are disjunctively ‘many’ in process of passage into conjunctive unity” (Whitehead 1978, 21). The third presupposition is that actual entities through their dynamic interrelatedness at every moment join together in “societies,” namely, genetically interrelated aggregates of actual entities with a “common element of form” or governing structure as their bond of corporate unity (Whitehead 1978, 34). All the persons and things of common sense experience are then “structured societies,” that is, societies composed of sub-societies of actual entities down to the atomic level within every animate and inanimate entity in this world (Whitehead 1978, 99).

Working with these presuppositions, Whitehead believed that he could offer a solution to the metaphysical impasse noted above. Since the ultimate units or reality are not inert material atoms serving as objects of reflection and analysis for scientists, but momentary self-constituting subjects of experience with internal relations to other subjects of experience in their environment, he could justify his conviction that nature is alive, not dead, an evolutionary rather than a static reality. Equivalently he was proposing a metaphysics of universal

intersubjectivity which has the potential to advance from very primitive forms of intersubjectivity at the atomic level to very complex forms of intersubjectivity at the animate level, especially the level of human beings and other higher-order animals. Naturally, one can here object that there is no empirical evidence to justify such a claim. In common sense experience, one sees, hears and touches not interrelated subjects of experience but things, some living but many others non-living. Whitehead's rejoinder in *Process and Reality* is that an actual entity is not only an immaterial subject of experience but a "superject," its counterpart or necessary self-manifestation as also a material reality (Whitehead 1978, 27-28). Thus, if not in its strictly immaterial reality as a momentary self-constituting subject of experience, at least as a superject embodying a certain pattern of existence and activity, actual entities are indirectly perceptible in terms of their material effects much as material atoms in sufficient numbers are likewise perceptible through their empirical effects.

Furthermore, in the next moment of the cosmic process a set of actual entities with an established pattern of existence and activity will be succeeded by still another set of self-constituting ("concreting") actual entities with basically the same pattern of existence and activity as their predecessors in corporate self-manifestation. Thus linked together they initiate or keep in existence a "society" with a common element of form or determinate pattern of existence and activity. Yet, given that the actual entities constitutive of a society are new at every moment of the cosmic process, they are able to develop new patterns of relatedness which are not quite the same as the patterns proper to their predecessors in that same society. Thus, if the pattern of interrelatedness among the constituent actual entities changes over time, the society itself with its common element of form will likewise evolve with the passage of time. This evolution in the common element of form for the society is, to be sure, much more gradual than the moment by moment changes in relation among constituent actual entities. Yet over time societies of actual entities, both inanimate and animate, can undergo enough change of pattern so that at least animate or living societies of actual entities (e.g., cells) can undergo species change. Randomness or chance is, of course, also involved, as proponents of Darwin's theory of natural selection insist. For, while actual entities are heavily influenced in their self-constitution by the patterns of existence and activity present in their predecessor actual entities in the same society, yet as self-constituting subjects of experience they do possess an innate spontaneity. Hence, united into societies of various kinds, actual entities have an inbuilt principle of self-organization which employs chance as well as necessity in its regular mode of operation.

Given these metaphysical presuppositions, it is relatively easy to see how Whitehead's metaphysical scheme allows for, even expects, the emergence of new patterns of order among societies of actual entities over time which are qualitatively different from those governing their predecessor societies and their constituent actual entities. As Harold Morowitz comments in *The Emergence of Everything*, "[e]mergence is both a property of computer models and of the systems being modeled. And so nature yields at every level novel structures and behaviors selected from the huge domain of the possible by pruning, which extracts the actual from the possible" (Morowitz 2002, 14). Yet, in my judgment, Whitehead's metaphysical scheme is still not quite prepared to explain the reality of emergence in the natural world. For his key category of "society" is somewhat ambiguous. Is it simply an aggregate of genetically interrelated actual entities or does it possess an ontological reality unto itself so that it exhibits a distinguishing characteristic or common element of form which is not quite the same as the pattern of self-constitution characteristic of its individual constituent actual entities in their dynamic interrelatedness here and now? Is a Whiteheadian society, in other words, an ontological whole which is reductively only the sum of its parts or members, or is it a new corporate reality which is more than and somehow other than the sum of those individual parts which sustain it at every moment?

What I am proposing here is what I suggested earlier, namely, that a Whiteheadian society is an enduring structured field of activity or environment for its constituent actual entities at any given moment. Because it is an objective field of activity rather than a higher-order actual entity or subject of experience, it is ontologically different from its constituent actual entities. Even though it emerges from and is sustained by its constituent actual entities at every moment, precisely as a structured or law-like field of activity it represents a new and higher level of existence and activity in nature and in turn calls forth or requires a further development in the self-constitution of future constituent actual entities. Through their membership in this altered field of activity the new actual entities themselves become something other than their immediate predecessors. For example, they are no longer the actual entities constitutive of an atom but the new species of actual entities which are constitutive of a molecule. That is, they are now much more complex in their individual self-constitution and thus capable of interaction with their contemporaries at a more complex level of existence and activity than before (namely, as a molecule rather than an atom).

A student of Whitehead's metaphysical scheme might here complain that this hypothesis of Whiteheadian societies as structured fields of activity for their constituent actual entities at every moment is not to be found in *Process and Reality*. This is true; but, as I see it, this field-oriented hypothesis for Whiteheadian societies still corresponds to what the master intended but did not succeed in expressing satisfactorily. That is, Whitehead clearly wanted to say that societies are more than aggregates of actual entities, however tightly interrelated. In the chapter on "The Order of Nature" in *Process and Reality*, for example, he says: "The point of a 'society,' as the term is used here, is that it is self-sustaining; in other words, that it is its own reason" (Whitehead 1978, 89). Likewise, in a book published after *Process and Reality* entitled *Adventures of Ideas*, Whitehead claims: "A society has an essential character, whereby it is the society that it is, and it has also accidental qualities which vary as circumstances alter. Thus a society, as a complete existence and as retaining the same metaphysical status, enjoys a history expressing its changing reactions to changing circumstances" (Whitehead 1967b, 204). The likeness to an Aristotelian "substance" here is unmistakable. But, of course, Whitehead cannot assert that a society in his scheme is in any sense of the word an unchanging substance without compromising his process-oriented metaphysics as a whole insofar as it is seen as a movement beyond or even repudiation of classical substance-oriented metaphysics.

Whitehead, to be sure, did use field-imagery in books on the philosophy of nature prior to composing *Process and Reality*. In *The Concept of Nature*, for example, he claims: "nature is a structure of events and each event has its position in this structure and its own peculiar character or quality" (Whitehead 1968, 166). Likewise, a few pages later he says: "The analysis of these adventures makes us aware of another character of events, namely, their character as fields of activity which determine the subsequent events to which they will pass on the objects {enduring characteristics} situated in them" (Whitehead 1968, 170). But in *Process and Reality*, field-imagery is only used with respect to what Whitehead calls the extensive continuum: "This extensive continuum is one relational complex in which all potential objectifications find their niche. It underlies the whole world, past, present, and future" (Whitehead 1978, 66). These "potential objectifications" are presumably actual entities in the first place, and only in the second place the societies into which these actual entities are aggregated within the extensive continuum. Whitehead also refers to entities within the extensive continuum as "united by the various allied relationships of whole to part, and of overlapping so as to possess common parts, and of contact, and of other relationships derived from these primary relationships" (Whitehead 1978, 66). But here too the focus seems to be more on the constituent actual entities than on the societies into which they aggregate. His insistence early in the pages of *Process and Reality* on actual entities/actual occasions as "the final real things of which the world is made up" (Whitehead 1978, 18) thus seems to have governed his thinking in the rest of the book.

4. CONCLUSION

My original hypothesis in this article was that the relatively new notion of emergence within contemporary natural science can be seen as a conscious or more often unconscious reformulation of the classical formulation for the relation between the One and the Many. According to the classical paradigm for the One and the Many, the One is a transcendent individual entity which gives order and intelligibility to the empirical Many. This understanding of the relation between the One and the Many initially found its place in the philosophy of Plato, Aristotle and the medieval scholastics (notably, Thomas Aquinas) but in an altered form it was foundational for the thinking of early modern philosophers from Descartes onward. That is, the One is still a transcendent individual entity but now it is the concrete individual subject of experience which gives order and intelligibility to the contents of sense experience. Kant only slightly modified this understanding with his assertion that the One is the transcendental, not the empirical, subject of experience which orders the phenomena of sense experience.

Reference to the One as the transcendent principle of order and intelligibility for the Many, however, has been largely repudiated by scholars in the humanities who with considerable justification claim that this paradigm for the relation between the One and the Many does not do justice to the concrete particularity of the entities in common human experience. Postmodernists like Jean François Lyotard reject what they term master narratives or meta-narratives as "thinly disguised attempts to control the interpretation of historical events in one's own favor" (Bracken 2012, 67). Yet within the natural and social sciences repudiation of the classical paradigm for the One and the Many has gone in the opposite direction, namely, toward the construction of thought-systems which aim at pure objectivity and regard human subjectivity simply as a prior condition for the formulation of

such systems. But in the natural sciences, above all in biology, a third possibility has become available. The empirical Many by their dynamic interrelation over time can produce a higher-order reality, a One that is no longer transcendent over the Many but emergent out of their dynamic interplay and yet, once in existence, exercises something like a formal (or informational) causality vis-à-vis the Many in their further interaction. One sees this in the way that atoms within molecules and molecules within cells function differently than they would simply as free-standing atoms or molecules. Something like an innate principle of self-organization seems to be at work in nature to allow this progressive emergence of higher forms of existence and activity within the cosmic process (Kauffman 1995, 3-30).

To provide a philosophical explanation for this generic understanding of emergence within nature, I appealed to the metaphysical scheme of Alfred North Whitehead in his master work *Process and Reality*. There I isolated the key terms of actual entity, creativity and society within his thought-system and elaborated on how in combination they allow for an innate principle of self-organization among actual entities as “the final real things of which the world is made up” so as to constitute societies as the higher-order One which is emergent out of the dynamic interrelation of the actual entities from moment to moment and yet, once in existence, exercises that formal or informational causality spoken of above upon the constituent actual entities, thereby allowing them to show greater complexity in their self-organization in line with their new participation in this higher-order socially constituted reality of a society. As I indicated above, Whitehead’s understanding of societies had to be modestly altered in order to justify this new understanding of the One as emergent out of the Many and yet enjoying an ontological status proper to itself as an objective socially constituted reality (as opposed to a higher-order subject of experience). What cannot be accomplished in this article, of course, is to lay out the application of this new dynamic paradigm for the relation between the One and the Many in all the academic disciplines to which it might be applicable if these same disciplines are interpreted from a conscious evolutionary perspective. But its appearance as an article in an explicitly interdisciplinary online journal might be the springboard needed for others to take up this challenge.

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