Nova et Vetera, English Edition, Vol. 17, No. 2 (2019): 451–464

How to Keep the Non-Reductive in Nonreductive Physicalism?

Nancey Murphy
Fuller Theological Seminary
Pasadena, CA

Introduction

I was delighted to be invited to give a presentation at the conference "Person, Soul, and Consciousness," organized by the Dominican School of Philosophy and Theology, July 14, 2017. However, it is a bit odd for me to be speaking at a conference with this title, because, first, I have regularly objected to using "person" as a philosophical concept. The definitions end up either ruling out many individuals whom we want it to cover, such as babies and people with disabilities, or else they rule in too much: I would vote for Kanzi, the bonobo, to be admitted. Second, I have spent years arguing that there is no such thing as a soul; and, third, I do not think anyone knows enough about consciousness yet to say much at a scholarly level; however, I reserve this particular remark to neuroscientific contexts.

Nonetheless, I was delighted to be invited, *especially* because there are so many papers on Aquinas's anthropology. He has seemed to me to be the most difficult of significant theologians to classify in terms of dualism, or something else. He appears to be a very complicated monist until you get to his argument for the survival of the rational soul during the intermediate state. At that point he sounds more like what is called a holistic dualist, in that a mere soul is not considered to be a complete human being.

My plan for this lecture involves two parts. First, I will give as brief an account as I can of why I favor a monistic approach to Christian anthropology, which, following fellow philosophers of mind, I generally call "nonreductive physicalism." Where I hope to make my contribution will be to make good on the claim that it is possible to be ontologically physicalist (with regard to humans) without reducing our traditionally understood higher faculties to mere brain functions. So in my second section, Atoms versus Complex, Self-Organizing, Dynamical Systems, I will present an account, as the title suggests, of complex dynamical systems theory. I believe that it not only solves the problem at hand, but also represents a genuine worldview change that has been happening quite quickly over the space of only about ten to fifteen years.

Why Christian Physicalism?

There are plentiful writings from the twentieth century up to today arguing against dualism and for monism, along with an enhanced appreciation for the *centrality* of bodily resurrection in the good news of the Gospel. However, during the eighteenth and nineteenth centuries, biblical critics had called miracles into question, *especially the Resurrection of Jesus*. So, whereas for centuries the immortality of the soul had been *combined*, in eschatology, with the general resurrection, "Enlightened" Christians focused only on the immortality of the soul. However, as biblical criticism became more sophisticated, especially in recognizing the need to read words (such as the Hebrew *nephesh*) in context, the question was raised around 1910 of whether *nephesh* had rightly been translated into Greek as *psyche* and then eventually into "soul."

Now, in speaking of Protestant developments, I have discovered, after moving from a liberal seminary to teach at an evangelical institution, that one always needs to specify whether one is speaking, on the one hand, of liberal or mainline scholars, or, on the other, of conservatives. Among liberal Protestants, by the 1950s, there was near consensus that dualism was a Greek cultural accretion to an earlier, more authentic, Hebraic theology and ought to be rejected. Conservatives are going through the same process now.

It has been difficult to sort out Catholic scholars. Using my quick and dirty research methods of reading secondary literature, it seems that during the twentieth century, Catholic biblical scholars were increasingly more likely to reject dualism, but no general account of Catholic theologians was possible.

It is now recognized that no simple distinction can be made between Greek dualism and Hebraic monism. First, Hellenistic and Hebraic cultures had been mixing for several centuries before Jesus's day. Second, we moderns have too much of a tendency to read René Descartes's sharp distinction between material and nonmaterial back into early Christian writers.

But suppose a dualism of material body and non-material soul or spirit was *not* biblical teaching. We need some explanation of how scholars could have gotten it wrong for so many years. Among Catholic scholars, this would be at least from Augustine up to Thomas; for most Protestants, it has been considerably longer.[1]

This question would require volumes to answer adequately. So I present only a few scholars' insights. First, we need to emphasize that biblical authors had different concerns than we do, and the question of what happens at death was not always central to Jewish thinking. This has been confirmed by several contemporary Jewish authors as well. Second, I have found James Dunn's work immensely helpful. Without falling into the 1950s error of trying to characterize *the* Greek view, he distinguishes between what he calls "aspective" and "partitive" accounts of human nature. He writes:

> In simplified terms, while Greek thought tended to regard the human being as made up of distinct parts, Hebraic thought saw the human being more as a whole person existing on different dimensions. As we might say, it was more characteristically Greek to conceive of the human person "partitively," whereas it was more characteristically Hebrew to conceive of the human person "aspectively."[2]

Thus, many of the ancient Greek philosophers were interested in the question: What are the essential parts that make up a human being? In contrast, for the biblical authors each "part" ("part" in scare quotes) stands for the whole person thought of from a certain angle or dimension. For example, Paul's distinction between spirit and flesh is not our later distinction between soul and body; "spirit" stands for the whole person in relation to God.[3] Dunn claims that "flesh" had a spectrum of meanings, but from some of Jesus's teachings I would guess that a central meaning was the hugely

---

1 But see note 3 below.

2 James D. G. Dunn, *The Theology of Paul the Apostle* (Grand Rapids, MI: Eerdmans, 1998), 54.

3 Note that many of the Radical Reformers (Anabaptists), beginning in the sixteenth century, held aspective positions. For example, Menno Simons described the "soul" as one's openness to God.

important role of kinship in the culture of his day.

Michael Welker writes that "the heart is an exceptionally important entity in Paul's anthropology. As in the Old Testament . . . it connects vegetative, emotional, noetic and voluntary functions. If psyche signifies the earthly, corporeal–mental *unity* of the human person, then the heart, *kardia*, stands for the emotional–voluntary depths. It is via the heart that the divine spirit reaches the human body and its mental capacities."[4] Note that Welker's account of "heart" incorporates bits of Thomas's vegetative, sensitive, and rational souls.

Systematic theologian Veli-Matti Kärkkäinen rejects dualism and claims that the best of current theologians do so also. However, he objects to my term, "nonreductive physicalism," because he thinks it emphasizes the physical at the expense of all of our other characteristics. Based on the complex account Scripture gives of the various aspects of human life, we decided that the best term for Christian theology would be "multi-aspect monism." A fine representation of these multiple aspects is found in Dunn's summary of Paul's anthropology:

> Paul's conception of the human person is of a being who functions within several dimensions. As embodied beings we are social, defined in part by our need for and ability to enter into relationships, not as an optional extra, but as a dimension of our very existence. Our fleshness attests our frailty and weakness as mere humans, the inescapableness of our death, our dependence on satisfaction of appetite and desire, our vulnerability to manipulation of these appetites and desires. At the same time, as rational beings we are capable of soaring to the highest heights of reflective thought. And as experiencing beings we are capable of the deepest emotions and the most sustained motivation. We are living beings, animated by the mystery of life as a gift, and there is a dimension of our being at which we are directly touched by the profoundest reality within and behind the universe. Paul would no doubt say in thankful acknowledgement with the psalmist: "I praise you, for I am fearfully and wonderfully made" (Ps 139:14).[5]

[4] Michael Welker, "Flesh-Body-Heart-Soul-Spirit: Paul's Anthropology as an Interdisciplinary Bridge-Theory," in *The Depth of the Human Person: A Multidisciplinary Approach*, ed. Michael Welker (Grand Rapids, MI: Eerdmans, 2014), 59 (ch. 2).

[5] Dunn, *Theology of Paul*, 78.

If biblical research and so much of contemporary theology were not at least *open* to monism, I would find myself in a tough spot. I appreciate Ernan McMullin's term "consonance"—I believe we need to seek *consonance* between theology and science. And it is certainly the case that biology, and especially neuroscience, point toward monism.

I also seek consonance between theology and *contemporary* philosophy. During the 1960s and 1970s, Anglo-American philosophical method was understood to be conceptual analysis. That is, in all statements (except tautologies) there were empirical elements (now ceded to science), but also conceptual elements. For example, the empirical question of how we *acquire* knowledge is empirical, but analysis of the *concept* knowledge was the philosopher's job. A correct analysis was thought to provide universal knowledge, immune to scientific refutation. The conceptual arguments at that time were on mind–body dualism versus the mind–brain identity thesis. Arguments for and against dualism, for and against the identity thesis, appeared to be interminable.

However, W. V. O. Quine's demolition of the analytic–synthetic distinction made empirical knowledge once again relevant to philosophical arguments (in ways I will not go into here).[6] In Jeffrey Stout's terms, conceptual *archaeology* needs to replace conceptual analysis. We need to know what a concept means in a particular era, and for a particular community of scholars.[7]

Consequently, the findings of neuroscience, making it increasingly difficult to explain why a mind is needed in addition to the brain, has turned nearly all secular philosophers into physicalists.[8] Many claimed to reject reductionism but, in my judgment, no one had an adequate account of how to avoid it.

My claim is that there are good biblical and theological reasons to prefer physicalism, but only if good reasons can be given to reject reductionism. Otherwise we lose all of the higher human capacities important to a theological vision of humankind. Daniel Dennett's book, *Freedom Evolves*, has received a lot of attention, but many reviewers accuse Dennett of "bait and switch" arguments.[9]

---

6 W. V. O. Quine, "Two Dogmas of Empiricism," in *From a Logical Point of View*, ed. W. V. O. Quine (Cambridge, MA: Harvard University Press, 1953), ch. 2.

7 Jeffrey Stout, *The Flight from Autonomy: Religion, Morality, and the Quest for Autonomy* (Notre Dame, IN: University of Notre Dame Press, 1981), 83–84.

8 Note that since the writings of Descartes, "soul" and "mind" have been nearly synonymous.

9 Daniel C. Dennett, *Breaking the Spell: Religion as a Natural Phenomenon* (New York: Viking, 2006).

Now, as reported above, Paul's anthropology emphasized our essential sociality, reflective thought, deep emotions and sustained motivations, and the ability to be touched by the Holy Spirit. My account of Dennett's simulacra of human capacities does not line up in direct opposition, but I believe it indicates enough of what the reductionist is willing to give up.

"Intentionality," in the philosophical sense, including beliefs, desires, and intentions, is essential for human sociality. Dennett claims we do *not* possess these characteristics. However, because attributing them to others allows us to predict behavior so well, this justifies us in taking "the intentional stance" toward others. Also, Dennett substitutes for altruism a concept of "benselfishness." Because of the social pay-off of being perceived as a good person, and the fact that the easiest way to maintain this perception would be to be a good person, we behave so as to appear to be altruistic, but it is for selfish motives. This has been described as pseudo-altruism. Likewise, he has been accused of providing only for pseudo-responsibility and pseudo-freedom. His account of human thought is based on a view of human language as nothing more than computer-like manipulation of strings of symbols. And Dennett, being a strident atheist, does not even think to provide an account of pseudo-spirituality. He believes religion is based on fear.[10]

So the question for the next section is how to account for the fact that we are not, in fact, at the mercy, as Dennett says, of an organization of a trillion mindless robots.

Atoms versus Complex, Self-Organizing, Dynamical Systems

Now, I have been speaking of these biblical and theological issues for years, so the first section was easy to write. However, I am not experienced in speaking about complex systems theory. My mentor at Berkeley, Paul Feyerabend, once said that significant conceptual changes begin with a group of people speaking nonsense to one another, but it eventually makes sense, and a new paradigm or conceptual scheme is created. I think I an still on the verge between sense and nonsense. But here goes: first, an account of why reductionism had such a hold on modern thought; second, what are the best accounts of anti-reductionism still working within the usual vocabulary of philosophy of science; and, finally, my attempt to convey the sense in which complex systems theory contributes to a new, "after-modern" worldview.

Already in the mid-seventeenth century, Thomas Hobbes developed

---

[10] Dennett, *Breaking the Spell*.

a theory of human nature and society based on an analogy with the new atomism in physics. He was also the first to propose the concept of a hierarchy of *sciences*, reflecting a hierarchy of *complexity*.

In the early days of modern physics, causal reductionism was, I believe, inevitable. Following Epicurus, the essential assumption was that everything that happens is a consequence of the motions and combinations of atoms, whose behavior was (most likely always) deterministic. The atoms were not thought to be affected by the wholes they composed. Thus, the behavior of the wholes, from the levels of physics, to chemistry, to biology, and finally to psychology, was ultimately the product of causation from the bottom up, and complex entities were *not* causes in their own right. So the defeat of causal reductionism in the human case needs to be the defeat of bottom-up causation; or as some would say, of part-to-whole determination.

The most significant criticisms of causal reductionism fall into three historical stages: first, an early emergentist movement (approximately 1920–1950), which was soon displaced by the reductionist ambitions of the positivists in philosophy of science; second, there was the exploration of the concept of downward causation beginning in the 1970s; and, currently, new attempts to define and defend both emergence and downward causation.

If bottom-up causation is the problem, then does downward causation solve the problem? I believe that Robert Van Gulick has done the best job of describing and defending downward causation. He says that although the objects picked out by the higher-level sciences are indeed composites of physical constituents, the causal powers of such an object are not determined solely by the physical properties of its constituents and the laws of physics, but also by the *organization* of those constituents within the composite. That is, a given physical constituent may have many causal powers, but only some subsets of them will be active in a given situation. The larger context or pattern of which it is a part may affect which of its causal powers get activated. Thus, the whole is not any simple function of its parts, since the whole at least partially determines what contributions are made by its parts.

Such patterns or entities, he says, are stable features of the world, often despite variations or exchanges in their underlying physical constituents; the pattern is conserved even though its constituents are not (for example, in a hurricane or even a blade of grass). Many such patterns are self-sustaining or self-reproducing in the face of perturbing physical forces that might degrade or destroy them (for example, DNA patterns). Finally, the selective activation of the causal powers of such a pattern's parts may in many cases contribute to the maintenance and preservation of the pattern itself. Taken together, these points illustrate that higher-order patterns can have a degree of independence from their underlying physical realizations and can exert what might be called downward causal influences without requiring any objectionable form of emergentism by which higher-order properties would alter the underlying laws of physics. Higher-order properties act by the *selective activation* of physical powers and not by their *alteration*.[11]

Downward causation and emergence are complementary concepts, in that emergence explains how the complex entities form in the first place. I believe that Terrence Deacon has provided the best account so far of emergence. He distinguishes three types or levels of emergence. There is no emergence in mere aggregates. The important difference between an aggregate and a system is that, in a system, it is *relational* properties of the constituents (as opposed to primary or intrinsic properties) that constitute the higher order.

Cases of first-order emergence include the viscosity of liquids and typical feedback systems such as a thermostatically controlled heating system. Because fluctuations in such systems are *dampened out* across time it is possible to give (rough) reductionist accounts of their behavior.

Second-order emergence occurs when there is *amplification* of a fluctuation rather than dampening. Systems in which this occurs are nonlinear; that is, their history matters. A simpler sort of self-organizing system is one in which higher-order patterns selectively constrain the incorporation of lower-order constituents into the system or select among possible states of the lower-level entities (this is Van Gulick's point, as well). More complex second-order emergent systems are also autopoietic: This means that they change the lower-order constituents themselves. An example is that the behavior of an organism can change its genome in certain cases. An autocatalytic cycle is more complex still, in that the system manufactures some of its own components; here a cell is an example. All of life involves second-order emergence of the more complex sort.

Deacon distinguishes between first- and second-order (as well as

---

11 Robert Van Gulick, "Reduction, Emergence, and Other Recent Options on the Mind/Body Problem: A Philosophic Overview," *Journal of Consciousness Studies* 8, nos. 9–10 (September–October 2001): 1–34; and Van Gulick, "Who's in Charge Here? and Who's Doing All the Work?" in *Mental Causation*, ed. John Heil and Alfred Mele (Oxford: Clarendon Press, 1995), 233–58. Both are condensed and reprinted in *Evolution and Emergence: Systems, Organisms, Persons*, ed. Nancey Murphy and William R. Stoeger, S.J. (Oxford: Oxford University Press, 2007).

third-order) emergence in terms of what he calls "amplification logic" or "the topology" of causal processes. In first-order emergent systems there is "nonrecurrent" causal architecture: A simple bottom-up and top-down relation in which global properties of the system (for example, density of components) makes a difference to the relations among components and thus to the behavior of the whole system.

Second-order systems have more "tangled" or "recurrent" causal architecture as a result of the amplification of lower-level fluctuations. This amplification changes the total state of the system in a way that makes a decisive difference for the future development of the system. This can lead to new orders of complexity.

Third-order emergence involves the interaction among three levels and appears (naturally) only in the biological realm. Here a variety of second-order forms emerge, such as cells, and are selected or constrained by the environment, but in such a way that a *representation* of its form is introduced into the next generation—the system has "memory." The simplest example is the evolutionary process. The micro-level (the genome) in interaction with the organism's environment, directs the construction of the organism (the mid-level), whose reproductive fate is determined top-down by the environment (top level). The preservation of *information* regarding the organism's success in the environment (a form of inter-generational memory) is the means by which relatively stable populations of successful organisms can be produced, but within which future fluctuations appear. Some of these may be amplified (preserved and re-entered into the system) by means of interaction with the environment, thus enabling the appearance of still higher degrees of complexity. Deacon describes such systems as exhibiting recurrent-recurrent causal architecture. The most important advance, of course, is the development of memory in individual organisms.[12]

Do these more sophisticated accounts of emergence and downward causation together solve the problems of the reduction of human capacities to biology? At first I believed that they did. But then the question arises: How is it *not* the case that humans are, in a sense, trapped by a combination of downward causation from their environments and the biological factors that do (still) contribute to their behavior? Where is there room for human agency? This is the point at which we must turn to the resources of complex systems theory.

"Systems" thinking has been developing over the past half-century,

---

12 Terrence W. Deacon, "Three Levels of Emergent Phenomena," in Murphy and Stoeger, *Evolution and Emergence*, 88–112.

although it has only recently begun to have a significant impact. Systems theory draws from a number of sources. As the term implies, there are significant roots in general systems theory, developed from 1928 through the 1970s by thinkers such as Ludwig von Bertalanffy. The idea was that the structure of complex entities, regardless of the academic field they fell into, could be modeled mathematically. Another early source was the study of cybernetics, the study of automated control systems, whether mechanical or biological. Current contributions come from information theory, nonlinear mathematics, the study of chaotic and self-organizing systems, and non-equilibrium thermodynamics. Examples of the systems of interest range from autocatalytic chemical processes, at the most basic, to weather patterns, insect colonies, social organizations, and, of course, human brains. Alwyn Scott, a specialist in nonlinear mathematics and neuroscience, states that a paradigm change (in Thomas Kuhn's sense) has occurred in science beginning in the 1970s. He describes nonlinear science as a meta-science, based on recognition of patterns in kinds of phenomena in diverse fields. This paradigm shift amounts to a new conception of the very nature of causality (and he says that it is in a way a return to Aristotelian concepts of causality).[13] Francis Heylighen, professor at the Free University of Brussels and founder of the Evolution, Complexity, and Cognition Community, has made a bolder claim: systems theory provides the resources for an entirely new worldview, including ontology, epistemology, and ethics. I attempt to set out here some of the essential concepts involved in this change.[14]

Several authors call for what might be called a shift in ontological emphases. Alicia Juarrero (another Aristotelian) says that one has to give up the traditional Western philosophical bias in favor of *things*, with their intrinsic properties, for an appreciation of processes and relations.[15] Heylighen states that the basic ontological categories for systems theory are agents and actions.

Systems have permeable boundaries, allowing for the transport of materials, energy, and information. The boundary is a matter of the tighter coupling of its components with one another relative to their coupling with entities outside of the system. The crucial *components* of complex systems

---

13 Alwyn Scott, "The Development of Nonlinear Science," *Revista del Nuovo Cimento* 27, nos. 10–11 (2004): 1–115; 2.

14 Francis Heylighen, unpublished paper written for a "Symposium on Research Across Boundaries" (University of Luxembourg, June 16–19, 2010).

15 Alicia Juarrero, *Dynamics in Action: Intentional Behavior as a Complex System* (Cambridge, MA: MIT Press, 1999), 124.

are not things but *processes*. So, for example, from a systems perspective a mammal is composed of a circulatory system, a reproductive system, and so forth, *not* of carbon, hydrogen, calcium. The organismic level of description is largely *decoupled* from the atomic level—that is, if the functional system works, it does not matter what its components are made of.

Systems are different from both mechanisms and aggregates in that the properties of the components themselves are dependent on their being parts of the system in question (for example, a circulatory system can only *be* what it is within the context of an organism). Philosophers distinguish between internal and external relations. External relations do not affect the nature of the *relata*, but internal relations are partially constitutive of the characteristics of *relata*. An essential assumption of the predominant modern worldview was that the world is composed of *things* related to one another *externally*. Systems theory takes the relations among the constituent *processes* of a system to be *internal*.

Systems range from those exhibiting great stability to those that fluctuate wildly. This is due to the fact that complex systems are nonlinear, that is, the current state affects the development of each future state. The difference in stability is due to the extent to which the system is sensitive to slight variations in initial conditions, and also to the extent to which there are feedback processes that either do or do not dampen out fluctuations. Systems at the extremes of this spectrum of stability are not of great interest to systems theoreticians. For example, a thermostatically controlled heating system is very stable but produces no novelty because it involves a negative feedback system that keeps the temperature within a set range. Imagine a "reverse" thermostat that provides positive feedback such that the hotter the building becomes, the more it increases the heating. This system is unpredictable, but not likely to last long. Thus, the systems of interest are those in the middle of the spectrum. Chaotic systems are now familiar to many. They result from having a sensitivity to initial conditions that falls into a very narrow range, resulting in their behavior falling into a predictable *range* of states.

More interesting are those at the edge of chaos. Here the system has the freedom to explore new possibilities and may "jump" to a new and higher form of organization. An understanding of how this can happen in terms of physics comes from the study of far-from-equilibrium thermodynamics. Such systems are called complex *adaptive* systems. They are characterized by goal-directedness, at least insofar as they operate in order to maintain homeostasis. In the process of self-maintenance they may create their own components. For example, in an autocatalytic reaction, molecule A catalyzes molecule B, which catalyzes more of A. The process will stabilize at some point unless additional materials are introduced into the system. In order for the system to maintain itself, the internal dynamics must determine which molecules are fit to be imported into the system and survive.[16]

Complex adaptive systems theory has dramatic consequences for understanding causation. While ordinary efficient causation is presupposed, systems theory developed specifically because such causation is inadequate to describe complex systems. This inadequacy is in part because complex systems operate on information as much as on energy and matter. More important is the fact that the relations among the components of a system need to be thought of in terms of *constraints*. An efficient cause makes something happen. A constraint *reduces* the number of things that can happen, due to the fact that the components are internally related to one another such that a change in one automatically changes the other. Juarrero says that the concept of a constraint in science suggests "not an external force that pushes, but a thing's connections to something else . . . as well as to the setting in which the object is situated."[17] More generally, then, constraints pertain to an object's connection with the environment or its embeddedness in that environment. They are relational properties rather than primary qualities in the object itself.

From information theory Juarrero employs a distinction between context-free and context-sensitive constraints. For example, in successive throws of dice, the numbers that have come up previously do not constrain the probabilities for the current throw (gamblers' superstitions notwithstanding); the constraints on the dice's behavior are context-free. In contrast, in a card game the constraints are context-sensitive: the chances of, say, drawing an ace at any point in the game are sensitive to history because the rules of the game, the number of cards in the deck, and so forth, create relations among the possible outcomes such that the probability of one occurrence is related to all of the others. This account suggests that a better term in place of "downward causation" is "whole–part constraint." The "higher-level" system, the whole, does not exert efficient, forceful causation on its components. Rather, global features of the system are such that a change in one component changes the probabilities of the occurrence of other lower-level events (an explanation of Van Gulick's selection).

Due to the role of probability in complex systems, it is necessary to do away with the sharp distinction between determinism and indeterminism, either quantum indeterminacy or complete randomness. The appropriate

---

16 Juarrero, *Dynamics in Action*, 126.
17 Juarrero, *Dynamics in Action*, 132.

middle term is “propensity,” coined by Karl Popper to mean “an irregular or non-necessitating *causal disposition* of an object or system to produce some result or effect.”[18]

An understanding of the concept of a propensity has been aided by the study of nonlinear mathematics and especially chaotic systems. It begins with a visual or imaginary “state space” or “phase space,” which is an *n*-dimensional space in which a trajectory represents possible transitions from one state of the system to another. Chaotic systems theory introduced the concept of a “strange attractor” to describe the development of chaotic systems over time. This is a “shape” in phase space that depicts the boundaries within which the system can be found during its evolution.

From the concept of a strange attractor the idea of an “ontogenic landscape” has been developed. This is a “topographical map” in which valleys represent areas in phase space in which the system is likely to stay. Peaks represent states in which the system will only be found as a result of a major perturbation, such as the injection of a great deal of energy. So the system has a propensity to remain within the valleys. The topography represents a summation of the general effects of a vast number of contextually-constrained interactions among the system’s component processes.

Now, a number of us claim that systems thinking represents a change in worldview. A number of years ago I developed criteria to distinguish modern from postmodern philosophies. Modern thought was constrained by (among other assumptions) a foundationalist epistemology; by a general theory of meaning as reference, supplemented by an expressivist theory to accommodate discourse that is obviously not mere nonsense, but failed to refer to the world; and by an individualist understanding of human nature. I suggested that anyone who simply left all of the arguments relating to these issues behind had escaped from the intellectual “space” of modernity. Epistemological holism left foundationalist arguments behind, the philosophy of language of “meaning as use” left the modern dichotomy of referentialism versus expressivism behind.

While correctly recognizing the important role of individualism in modernity, it has only been in these past fifteen years that I came to see individualism as but one manifestation of the modern metaphysics of atomism and reductionism. And it is only now that I know the escape route from this set of assumptions—namely complex systems theory.

---

18 David Sapire, “Propensity,” in *Cambridge Dictionary of Philosophy*, ed. Robert Audi (Cambridge: Cambridge University Press, 1995), 657.

Conclusion

A number of other scholars would argue that this new set of concepts, particularly those of complexity theory, gives us the conceptual tools to explain how downward "causes" cause without violating the causal closure of the physical and without postulating causal overdetermination. Humans, who are complex, self-organizing, dynamical, adaptive systems, are partially *decoupled* from their biology, attend *selectively* to environmental constraints, and thus are able to become agents in their own right.

However, higher animals possess these features as well. So a remaining question is what distinguishes adult humans' morally responsible actions from those of animals and even small children. I have adopted an account of moral agency worked out by Alasdair MacIntyre.[19] Morally responsible action (as I summarize it very briefly) depends on the ability to evaluate one's reasons for acting in light of a concept of the good. These philosophical capacities can then be investigated in terms of the cognitive prerequisites for such action, such as a sense of self, the ability to predict and represent the future, and high-order symbolic language, which allows for abstract concepts such as goodness, virtue, and so forth.

So with this addition to the argument that organisms are (often) the causes of their own behavior—the argument I have made briefly in this paper—I believe it is possible to make the claim to have eliminated many of the reductionist worries that seem to threaten our traditional theologically informed conception of ourselves—and without needing to postulate any additional metaphysical component. N&V

---

19 Alasdair MacIntyre, *Dependent Rational Animals: Why Human Beings Need the Virtues* (Chicago: Open Court, 1999).