

EMERGENCE AND HUMAN UNIQUENESS: LIMITING OR DELIMITING EVOLUTIONARY EXPLANATION?

by J. Wentzel van Huyssteen

Abstract. Philip Clayton's book *Mind and Emergence* presents a highly sophisticated argument against any kind of uncritical theology that might want to follow science into a world of overly narrow, compartmentalized disciplines that do not sufficiently communicate between themselves. Clayton argues persuasively that the basic structure of the phenomenal world is multileveled, with emergent properties and degrees of freedom that cannot be adequately described, predicted, or explained in terms of lower-level phenomena only. Moreover, the various levels of organization are linked to one another by interfaces of mutual constraint in terms of upward and downward causation. The most valuable part of Clayton's argument, however, is that in a philosophy of emergence one must also, if not especially, account for the role of the biological sciences and especially for the influence of human thoughts and skills, human choices and actions, and—one of the most important causes of all—human purposes. Clayton's biggest challenge is that the level of human personhood offers us the only appropriate level to introduce the question of God and the possibility of divine agency. I critically evaluate this central claim and its implications not only for the extent of divine influence on the world but also for the scope and limitations of the interdisciplinary dialogue between theology and the sciences.

Keywords: aesthetic sensibility; emergence; emergence of life, convergence, and intelligence; evolution of culture; evolutionary epistemology; human uniqueness; interdisciplinary dialogue; levels of complexity; the limits of interdisciplinarity; mental causation; moral sensibilities; personhood; physical causation; Polanyi's Principle; religious sensibility.

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In Philip Clayton's important work *Mind and Emergence: From Quantum to Consciousness* (2004) he not only makes a compelling case for emergence and multileveled complexity but by implication also argues for the necessity of multidisciplinary thinking. For those of us who live and work in the interdisciplinary domain of science and religion, or theology and science, this should be of primary importance: both human thought, as it has culturally evolved in separate disciplines, and the physical systems within which we live exhibit a level of complexity within and across systems that makes it impossible to understand the important phenomena that are affecting humans today from the perspective of one discipline only (see Brown 1996, 407). I see as the persistent subtext of Clayton's book precisely his vision that single disciplines offer too narrow a perspective when it comes to understanding specific phenomena, even phenomena on a physical or biological level. The transversally connected systems and domains that are revealed by emerging and ever-increasing levels of complexity certainly yield an epistemic context in which interdisciplinary approaches to understanding and problem solving should become a top priority for theologians committed to a public understanding and transforming of our contemporary culture. Clayton's book thus proffers a sophisticated warning for any theology that might want to follow science into a world of overly narrow, compartmentalized disciplines that do not sufficiently communicate between themselves.

This response has been challenging for me to write, mainly because I am in agreement—and enthusiastically so—with almost everything that Clayton argues in this book. In many ways it is reminiscent of what I view as Stephen Jay Kline's indispensable work *Conceptual Foundations for Multidisciplinary Thinking*, published a decade ago (1995), in which Kline also focused on the fact that the basic structure of the phenomenal world is multileveled, with emergent properties and degrees of freedom that cannot be adequately described, predicted, or explained in terms of lower-level phenomena only. Moreover, the various levels of organization are linked to one another by interfaces of mutual constraint in terms of upward and downward causation. What Kline did not give us, and what is probably the most valuable part of Clayton's argument, is that in a philosophy of emergence one must also account for the role of the biological sciences and especially for the influence of human thoughts and skills, human choices and actions, and—one of the most important causes of all—human purposes. Against this background, then, we take a closer look at Clayton's central argument.

A PHILOSOPHY OF EMERGENCE

At the heart of Clayton's book is, obviously, the notion of emergence. Emergence is the view that new and unpredictable phenomena are natu-

rally produced by interactions in nature; that these new structures, organisms, and ideas are not reducible to the subsystems on which they depend; and that the newly evolved realities in turn exercise a causal influence on the parts out of which they arose (Clayton 2004, vi). The emergence thesis suggests that consciousness, or mind, is derived from and thus dependent upon complex biological systems. In this sense consciousness is not utterly unique; conscious phenomena manifest important analogies to emergent realities at much earlier points in evolutionary history. Clayton thus defends the thesis that mind (and, therefore, causally efficacious mental properties) emerges from the natural world as a natural further step in the process of evolution. On this view a theory of emergence becomes a philosophical elaboration of a series of scientific results that best expresses the philosophical import of evolutionary theory. Emergentist holism furthermore implies that emergent properties are irreducible to lower-level phenomena, that reality is divided into a number of distinct levels, and that there are forms of causality not reducible to physical causes (Clayton 2004, 2, 5).

Clayton defines as the most important characteristic of emergence, especially of *strong emergence* (emergence with mental causation), the concept of downward causation—the process whereby some whole has an active nonadditive causal influence on its parts (2004, 49). Here Clayton's argument is strongly reminiscent of and supported by what Kline (1995, 115ff.) calls Polanyi's Principle. Michael Polanyi developed the important idea that complex hierarchical systems rest on the existence of interfaces of mutual constraint (or interfaces of dual-level control) in many important classes of systems and quite specifically wanted to explain the limitations of both bottom-up and top-down approaches (Polanyi 1969). As such, Polanyi's Principle stated the following two maxims: (1) In many hierarchically structured systems, adjacent levels mutually constrain but do not determine one another; (2) In hierarchically structured systems, the levels of control (usually upper levels) harness the lower levels and cause them to carry out behaviors that the lower levels, left to themselves, would not do (Polanyi 1969, 225f.; see Kline 1995, 115, 119).

For a philosophy of emergence the idea that adjacent emergent levels would mutually constrain one another, and that upper levels would "harness" lower levels for novel types of behavior, seems to be crucial. It is central to an understanding of Clayton's view of the role of self-organizing complexity in biological emergence and also the emergent character of laws on the biological level. These laws would in fact be emergent, too—they would depend on the underlying physical and chemical regularities but would not be reducible to them (Clayton 2004, 78). For this reason Clayton can argue that emergence in biological evolution adds an important new dimension to the productive process that is natural history: Now for the first time causal agents emerge that include an element of memory

to their offspring. Emergence suggests that in biological evolution particular features can be discovered that could aptly be described as emergent, and thus the biosphere represents a fantastic increase in complexity from the physical components out of which it emerged (2004, 84f.).¹

Clayton develops this important idea further. "When in addition internal changes in biological entities themselves become productive of complex behaviors, and in particular when they enhance the organism's prospects for survival and reproduction, we speak of them as purposive behaviors" (2004, 97). Introducing the controversial notion of purposive behavior, Clayton, however, correctly argues that biological evolution never uses purpose as an overall explanatory category, and one cannot speak of evolution as such as having a purpose. One cannot say that nature itself possesses purposes. For Clayton this does not, however, prevent the ascription of proto-purposiveness to biological agents. In fact, we might call this a theory of purposiveness without purpose (p. 97). On this view the behavior of organisms represents a middle instance between the nonpurposiveness of chemical emergence and the fully intentional purposive behavior of conscious agents. Implied here is that primitive organisms do not consciously carry out purposes in the way an intentional agent does, but the complex parts of an organism work together for its survival, and thus not only are the chances of the organism's survival enhanced but also the survival of its genotype is maximized (p. 97). Thus, although purpose(s) cannot be ascribed to evolution as such, it/they can in a qualified sense be ascribed only to organisms within the biological world.

EMERGENCE AND HUMAN UNIQUENESS

This theory of emergence allows us now to recognize human thoughts, human intentions, and human symbolic interactions as a genuinely new level of experience and behavior. Like prehuman forms of activity within the biosphere, human thought is conditioned by the regularities of physical laws and by the quasi-intentional level of biological drives. The biology of emergence therefore suggests that, if irreducible mental causation does exist, it can be fully understood only in terms of a developmental story that includes the role of physical laws, biological drives, and the increasing spontaneity of behavior in more complex organisms—features that we share with other animals and that also distinguish us from them. Clayton puts it well: As organisms grow more complex, they manifest spontaneous behaviors of greater frequency and complexity to the degree that one must finally acknowledge a qualitative difference (2004, 99). And precisely the act of human decision making manifests this range and quality of choice in a manner that is both continuous and discontinuous with its developmental stages. In this sense the human mind can actually be seen as an "isolated peak in the evolutionary landscape" (2004, 100). Darwin already recognized this, although for him a difference in degree

would never imply a difference in kind (Clayton 2004, 99f.). This ultimately is another reason why Clayton opts for strong emergence—because it provides us with the most viable solution to the mind-body problem: What we call *mind* emerges through the evolutionary process, and, however novel mental events may be, they will never be fully understood apart from the details of this process (p. 101).

Clayton correctly states that it would not be possible to engage in reflection on the relationship of mind and brain without also considering the evolutionary history that produced brains in the first place. This builds into the distinctiveness of the emergentist thesis and its claim that the natural world exhibits a variety of levels at which distinct types of laws and causes can be recognized. For this reason, understanding the relationship between mind and brain—between consciousness and its neural correlates—requires understanding the multileveled structure of the natural world. Clayton has shown that on this level the appearance of mental causes is, in one sense, just another case of emergence, just another case in which a complicated natural system gives rise to unexpected casual patterns and properties (p. 107).

I would argue that exactly at this point Clayton's argument is supported by current evolutionary epistemology and also by various scholars in contemporary paleoanthropology, cognitive archaeology, and neuroscience. Both Simon Conway Morris (1998; 2003) and Ian Stewart (1998) have argued that, as far as *Homo sapiens* concerned, we may be the product of evolution, but we seem to have the ability to transcend our biological origins. This implies that in evolutionary development DNA is not the sole determining factor of human distinctiveness; it exists, rather, in interaction with the spectrum of (restrained) possibilities provided by the laws of nature. When we do go beyond biological evolution to richer notions of culture, the notion of human personhood should include not only human self-awareness, creative intelligence, and consciousness but also the fact that we actually use our conscious, self-aware minds in creative new ways to do uniquely human things in art, science, religion, and the many other domains of human culture.

In some forms of contemporary evolutionary epistemology exactly this argument has been carefully refined and developed further to include a strong notion of embodied epistemology. Henry Plotkin has argued that once intelligence has developed in a species to the degree that it has for *Homo sapiens*, self-conscious brains acquire a causal force equal to that of genes. For evolutionary theory to be complete regarding humans, emergent intelligent behavior must be included, and so must a very peculiar feature of intelligent behavior, namely, culture (Plotkin 1993, 177). Franz Wuketits would say that biology offers the necessary but not the sufficient conditions of culture (Wuketits 1990, 31). The study of human evolution, then, can clarify the lower-level preconditions of cultural evolution, but it cannot explain the particular paths a culture will take.

In his *Beyond Evolution* (2002) Anthony O'Hear argues along similar lines that, although the theory of evolution is successful in explaining the development of the natural world in general, it is of more limited value when applied to humans, human nature, and human culture. Moreover, precisely because of such distinctive traits as consciousness, self-awareness, reflectiveness, and rationality, we humans have the added ability to take on cognitive goals and ideas that cannot be justified merely in terms of survival promotion and survival advantage. Therefore, our typical human quest for rational knowledge but also our moral sensibilities, aesthetic appreciation of beauty, and religious disposition, while all deriving in important ways from our biological nature, once having emerged cannot be analyzed only in biological or evolutionary terms. In this sense, we clearly transcend our biological origins, and in doing so we have the ability to transcend what is given us in both biology and culture. O'Hear wants to push even further: We are prisoners of neither our genes nor the ideas we encounter as we each make our personal and individual way through life (O'Hear 2002, vii).

All of this resonates directly with Clayton's argument that evolutionary studies show that the distinct features of human cognition depend on an increase in brain complexity. However, at some point in evolution this particular quantitative increase gives rise to what appears as a qualitative change. Even if the development of conscious awareness occurs gradually over the course of primate (and I would add hominid) evolution, the end of that process (at least for now) confronts the scientist with something new and different: symbol-using beings whose language use is clearly distinct from those who preceded them (Clayton 2004, 109). For Clayton strong emergence is consistent with the emergence of consciousness and as such also consistent with the neuroscientific data as well as with the constraints on brain functioning. Moreover, it has the merit of conceiving of mental activity in terms of mental causation. Clayton is therefore arguing for an emergentist anthropology that begins with the notion of human persons as embodied, psychosomatic entities: Humans are both body and mind in the sense that we manifest both biological and mental causal features, and both in an interconnected manner (2004, 143).

If, then, emergence is visible in the evolution of life, how much more evident is it in the evolution of culture—in human thought, in the explosion of science and technology, and in the evolution of language, moral awareness, and the appreciation of beauty, ritual, and religious belief. Personhood is therefore a level of analysis that has no complete translation into a state of the body or brain. The language of physics or biology and the language of personhood only partly overlap; one cannot do justice to one using only the other. Clayton makes this point forcefully: To say that the human person is a psychosomatic unity is to say that the person is a complexly patterned entity within the world, one with diverse sets of natu-

rally occurring properties, each of which needs to be understood by a science appropriate to its own level of complexity. We need multiple layers of explanatory accounts *because* the human person is a physical, biological, psychological, and spiritual reality. The existence of these multiple layers in reality Clayton calls ontological pluralism, and the need for multiple levels of explanation is called explanatory pluralism. From this flows the thesis that ontological pluralism begets explanatory pluralism (Clayton 2004, 148f.). For the human person this fundamentally implies the real existence and causal efficacy of the conscious or mental dimension of human personhood.

EMERGENCE AND RELIGION

The crucial question that remains is whether the religious dimension or phenomena of religion should be seen as a new emergent level as well. This question Clayton, wisely, answers with a no. From an emergentist perspective the existence of religious or spiritual experiences in humans need not represent anything more than a highly complex but natural part of human social-biological existence. In fact, it is very human to form religious beliefs, engage in religious practices, and have religious experiences (Clayton 2004, 59). A somewhat more difficult question is whether God should be seen as an emergent God and whether the actual existence of a God who acts would introduce a new, causal level distinct from that of human being. Could this in any sense be seen as yet another level of emergence? Clayton answers this question with both a yes and no—no, because a being that preexists the entire physical cosmos cannot be explained by the same sort of emergence that explains the evolution of human thought and culture, and yes, there could be a conceptual progression in the process of our understanding moving from the sum total of naturally emergent phenomena to some sort of ground or source of all such phenomena (2004, 59f.). Clayton qualifies this carefully: This kind of view could at best represent a sort of argument from analogy—*not* a further rung on the ladder of emergence but an argument from the world as a whole to its metaphysical source. On this view, combining theism and emergence yields a position that is theologically dualist but not dualist with regard to human mind or consciousness (2004, 60).

At this point in his argument Clayton moves closer to the idea of God and asks: Is it possible to think about a level beyond mind? That is, can the term *emergence* be used for whatever one thinks transcends or comes after the complexity of the human mind? Is the emergence of deity the only plausible metaphysical response to the new sciences of emergence, or is any form of nonnaturalist metaphysics still a viable option in response to an emergent world? (2004, 169) He answers by pointing to the fact that the sciences of emergence do provide some impetus in the direction of the

emergence of deity. However, such assertions would always have an ambiguous epistemic status. In one sense it is purely naturalist, because it does not assert the existence of any supernatural entities; in another sense it goes beyond naturalism by introducing predicates such as *spirit* or *deity* as aspects of the world. This would seem to suggest that spirit or divinity would have to be an emergent level within the natural world. Clayton calls this postulation *the emergence of deity*: the view that there is no substance or thing that is God but that deity is a quality that the universe comes to possess increasingly over time. On this view God would not exist as some sort of separate object, but there may be an increasing “deification” of the universe over time (Clayton 2004, 167). This option would be a radical naturalist one and as such highly reductionist. On this view a massive prior metaphysical assumption would already be made, and God (or deity) would be narrowly filtered through emergence.

To find a more satisfactory answer to this question, Clayton argues that the human person, understood as integrated embodied self or psychophysical agent-in-community, offers the only appropriate level on which to introduce the question of God and the possibility of divine agency. Only on this level could a divine agency be operative that could exercise downward causal influence without being reduced to being a manipulator of physical particles (p. 198). Clayton argues that only a causal influence that worked at the level of the human person as such could affect the kinds of dimensions that are religiously significant without falling to the level of magic: a person’s sense of her relations with others, her higher-order affective states, her ethical striving, and her sense of the meaningfulness of her existence in relation to the world around her (p. 198).

For the believer in God this would mean that he or she will be unable to explain in human scientific terms how it is that God affects a person as such. We know that all natural influences on the affective or mental state of persons are mediated through some sort of physical input to the human mind: spoken words, gestures, texts, artistic creations. Any notion of divine influence as presupposed by a theist would not be mediated in this fashion, which makes divine influence disanalogous to all other influences on human persons and would again reflect a dualistic moment in any account of divine action. However, thinking of divine influence in this way does not require negating or setting aside what is known scientifically about mind and emergence. For Clayton, proposing a model of influence at the level of integrated persons, which in turn influences specific mental, affective, and physical processes, actually avoids the implausibilities of the competing models of divine action. It certainly avoids the impression that divine action could take place only through the breaking of physical laws, which for Clayton would conflict with “standard scientific assumptions about how human thought works” (p. 199).

Clayton does comment that from a natural scientific point of view it may seem problematic to ascribe any causal role to something as amorphous as an integrated human self (p. 199). He answers this question by pointing to modes of conscious being and how the human self is best understood in terms of its dispositions to act in certain typical ways, to have particular conscious thoughts or experiences in response to particular stimuli. From this perspective it is clear that human dispositions *do* make a difference in the world (p. 199). Behavioral tendencies and dispositions, furthermore, can be defined only in a conceptual and causal context that includes persons, moral predicates, linguistic conventions, and social institutions. In fact, such dispositions may be broad enough to include many of the sorts of features traditionally associated with religious experience, such as metaphysical concepts, a concern with ethical obligations, the quest for personal integration, and the search for meaning (p. 200).

The idea that God would act exclusively on a human-persons level raises another problem that could pose a dilemma for those who believe in God—namely, the extent of the divine influence on the world. For Clayton, if theism implied that God also influences the physical evolution of the cosmos or guides evolution at a biochemical level in order to finally produce human beings, one would necessarily be committed to a strong view of physical miracles (p. 200). An important question that now arises is whether the idea that God guides evolution at a pre-personal, biochemical level necessarily leads to a strong view of physical miracles. In fact, if God does not begin influencing the world until organisms complex enough to manifest mental causality appear on the scene, how can we understand God as causally responsible for the emergence of those conscious, mental agents in the first place?

Clayton seems to avoid this question and instead points to the fact that altered notions of divine creation and providence would be required for any theology that would seek to be consistent with the natural sciences. This is troublesome on at least one level, for, instead of asking the interdisciplinary question about the possibilities and limitations of interdisciplinary dialogue, Clayton still seems to yield to an allegedly superior scientific rationality. Clayton even says that, to the extent that Conway Morris (2003) and others are right in assigning a high probability to the evolution of intelligence, it becomes plausible that God could have initiated this natural process with the intent of bringing about intelligent life (Clayton 2004, 200). My point, of course, is that this precisely implies causality beyond the human-persons level.

Clayton goes on to state that “how early in the evolutionary process God could begin to influence individual organisms will depend on one’s understanding of emergence in evolution, and hence on further scientific study” (2004, 200). This move, taken to the extreme, could be fatal for theology, because it reveals a total commitment to the epistemic priority of

science—and at the expense of theological boundaries. Whether or not (and not “how early in the evolutionary process”) God influences the evolutionary process depends not only on one’s understanding of evolution but also on one’s understanding of God, theology, and the resulting interdisciplinary dialogue. Furthermore, to state that the presence of cognition, consciousness, and self-awareness in primates “opens the door in principle to divine influences at a much earlier point in biological evolution” (p. 201) really has the startling implication that we would be willing to limit God’s influence in principle only because we cannot (yet) explain it scientifically! It seems that a confusion of disciplinary boundaries and of the scope of transversal intersections between widely divergent disciplines could easily lead to disciplinary overclaims, especially if it is also tied to a discussion of the possibilities of divine revelation (whether or not communicative, whether or not propositional) that seem to be far removed from the complexity of the role of oral and textual traditions in mainstream theology.

EMERGENCE AND DISCIPLINARY BOUNDARIES

Clayton’s rather abstract treatment of religion, theism, the divine, divine causation, and even revelation veers toward more solid ground when at the end of the book he states that the argument sketched in the final section provides strong reason to suspect that the particular beliefs and dispositions of different cultural and religious groups will greatly affect what different humans (and human groups) will take to be “divine communications” (p. 203). Indeed, as Clayton admits, a prior belief in God, Yahweh, Allah, or Brahman will strongly predispose the believer to construe any actual divine influences in highly specific ways. But this fact, I believe, has strong epistemic implications. What it really means in terms of the contextual nature and disciplinary integrity of theological reflection is that not only in the end (so p. 203) but already at the beginning a specific faith perspective is necessary if we humans even want to entertain the question of which revelations, if any, might serve in some ways as a guide to understanding God’s nature. On this view the ambivalence of reading and interpreting God’s action in the world certainly remains, but there is no ambivalence regarding the metaphysical/theological conviction that God somehow acts in our lives and in our world.

Interestingly, and significantly, Clayton writes about the relationship between scientific and nonscientific factors as humans seek to understand their place in the universe (p. 204) and then proceeds to give a negative answer to the question of whether the natural sciences will eventually be able to comprehend *all* of the levels that are relevant for a causal explanation (p. 205). Consistent with his theory of emergence, Clayton now wants to show clearly that equating knowledge and natural science would be a serious mistake (p. 205). Clayton puts this well: Some levels of reality are

ideally suited for mathematical deterministic explanations (macrophysics), others for explanations that are mathematical but not deterministic (quantum physics), and others for explanations that focus on structure, function, and development (biological sciences from genetics to neurophysiology). At other levels laws play a more minimal role, and idiosyncratic factors predominate; hence, narratives tend to replace measurements, and prediction becomes difficult at best (p. 205).

It appears, furthermore, that much of the interior life of human beings, and whatever social interactions of creative expressions are based on this interiority, fall into this category. For Clayton the ladders of levels of complexity do not end here, however. Persons ask questions about the meaningfulness of the natural and social worlds in which they live and move. Once again, a level of explanation becomes a part of a broader whole, and thinkers are invited to participate in the quest for knowledge at the next higher level. In spite of the tremendous explosion of scientific knowledge today, this does not mean that beyond the reach of the natural sciences there is no knowledge but only opinion and affect (p. 206). On this view the emergence argument would be precisely the reason why the positivist equation of knowledge and natural science would be mistaken. Knowledge does not come to an end when the boundaries of physics and biology are reached.

These arguments of Clayton suggest a proper epistemic respect for the natural limitations of scientific knowledge and scientific explanations but remain strangely in tension with his earlier argument for divine action at a persons level, where the question was not “whether or not God influences the evolutionary process” but “how early in the evolutionary process does God begin to influence individual organisms” (p. 200). As became clear earlier, on this view God’s action (and our theological understanding of it) clearly seemed to be limited by a “superior” scientific explanation.

This specific interdisciplinary problem is helped, I believe, if we compare it to the work of someone who has come to a slightly different conclusion. In his book *Life’s Solution: Inevitable Humans in a Lonely Universe* (2003) Conway Morris argues that the emergence of life itself would always and inevitably lead to intelligence. Much of modern science—physics and especially biology, of course—suggests that the existence of human persons is a random accident of nature. For Stephen Jay Gould the awesome improbability of human evolution derives directly from the contingency of the adaptive evolutionary process. Conway Morris argues directly against this view, claiming that if our planet were even slightly different from the way it actually is, life and intelligence might not have emerged at all. He expands this view to include the fact that there are actual constraints on the possibilities of evolutionary development. There is a convergence, or a similarity in pattern, in the solutions provided by evolutionary mechanisms, and biological evolution thus follows the inevitability of certain

trends or trajectories, most significantly resulting in the inevitability of sentient life and human consciousness.

Conway Morris is aware of a general fear of notions of purpose or teleology and that the idea of convergence might pave the way for intelligent-design theorists who would want to argue from the irreducible perfection of patterns in nature to a Creator (2003, 111, 144). He does not allow the argument to move in this direction, though, and his position is based on real scientific factors that constrain the possible outcomes of evolution. Nowhere do these constraints imply any kind or form of intelligent design, in which scientific data are used as proofs of the existence of God as a cosmic designer. Furthermore, Clayton actually has made a key point here: The degree of contingency in evolution should be uncoupled from the question of faith in God and does not necessarily correlate with the probability or improbability of theism. For scientific reasons one could, for instance, hold that evolution is highly constrained and still remain an agnostic, or one could believe that the outcome of evolution is highly contingent and still be a believer in God (Clayton 2004, 162).

Conway Morris's discussion of evolutionary trends or trajectories within the context of evolutionary biology certainly takes into account the abundance of convergence as a sign of the constrained process of biological evolution. Interestingly, when compared to Clayton's development of the notion of divine action, Conway Morris's focus on evolutionary trajectories and convergence does seem to leave room for a notion of emergence that is more compatible with traditional notions of God and transcendence that do not need to be filtered through scientific notions of emergence. Theologically speaking, of course, if there is a God, and if this God wills humans to exist, human existence will not be an accident. Scientifically speaking, we cannot conclude from convergence and evolutionary trajectories to the existence of God, but in scientific terms it also seems to be difficult to deny these convergences to sentient life and human consciousness. Phrased differently, if God does exist, theologically speaking the laws of nature will be set up so that we humans will come into being, however improbable it might seem from our point of view (see Ward 2006, 10). What this means, again theologically, is that if God has shaped the cosmos and its evolution in such a way that humans would emerge—humans who would be able to be in a personal relationship with this God—the basic laws of the universe will from the beginning be oriented toward that end, even if we cannot detect that scientifically. And here the epistemic limitations of interdisciplinary dialogue are clearly at work: What from a scientific perspective looks like a lucky accident in a world without God will from a theological perspective be seen as providential. On this view, it becomes possible to say that to understand human nature is to understand in some provisional way the fundamental laws of the cosmos as a whole and how they have operated to generate the carbon-based life forms of a specific anatomical structure, namely us (see Ward 2006, 24).

However random or contingent the process of evolution has been, it still remains remarkable that these random mutations should continue over millennia to generate some organisms that are capable of becoming cumulatively more complex. In Keith Ward's words, how remarkable that the environment should be precisely such as to select accumulated "improvements" that eventually lead to the development of brains and consciousness and intelligent moral agents (2006, 32). From a scientific point of view these arguments, and Conway Morris's notion of convergence, could never prove the existence of God or God's action in the history of the world to bring forth human persons. That does not take away from the fact that, as in the case of the fundamental constants and forces of nature, the evolution of organic life requires a great deal of fine tuning in the sorts of mutations that occur and the sorts of environment that exist in order to produce intelligent life. In this sense the argument for convergence and the inevitability of human personhood and intelligence can be seen as another extension of the fine-tuning argument. Here we humans, or something like us, result from natural tendencies implicit in the fine structure of the cosmos right from the beginning, and God could create a universe in which there is much room for creative freedom and for the exercise of moral responsibility and still have a goal for this universe (Ward 2006, 33, 37ff.). On this view, I believe, divine action need not be carefully constrained to the human-persons level so as not to conflict with physical laws (which is what Clayton argues) but is in fact recognized, by the believer, as a guiding force for the whole of the evolutionary process.

In fact, if there is a God who creates the laws of nature, that God could also act in ways not falling under the laws of nature. As Ward argues, the creation of the laws of nature cannot itself be in accordance with any laws of nature, so in this sense the possibility of divine action beyond the laws of nature is established by the initial hypothesis of creation (Ward 2006, 112). The character of such a divine influence would be compatible with the existence of the general laws of nature, with the general structure of chance, freedom, and necessity that characterizes the universe, and with those features of emergence and self-organization that are suggested by modern science.

On this view the interdisciplinary dialogue between theology and science is definitively influenced by the fact that the theological voice will necessarily be embedded in a religious commitment in which faith in God is a kind of leap of faith, a practical commitment beyond what any scientific evidence would compel any reasonable person to believe. But we also now know that it is not a leap into irrational absurdity based on no evidence at all. It is a reasonable commitment based on a consideration of the sorts of experiential evidence that are appropriate. That is no more than we require and accept in most of the great personal decisions that mark our earthly lives (Ward 2006, 123).

CONCLUSION

Philip Clayton's imaginative engagement with emergence certainly challenges theologians to move beyond the narrow disciplinary domain of theological reflection and to rethink what human distinctiveness and personhood might mean theologically for a being that has emerged biologically as a center of embodied self-awareness, consciousness, personal identity, and moral responsibility. In addition, human personhood, when reconceived in terms of imagination and our remarkable symbolic propensities, may inspire theologians also to revision such a crucial theological notion as the *imago Dei* (image of God) as a concept that acknowledges our close ties to our sister species in the animal world while at the same time challenging us to rethink our own species specificity and the typically human propensity for religious awareness and experience. The emergence of this kind of mental complexity should resonate with and enrich theology's deepest convictions about human personhood and open up arguments for the plausibility of a theological redescription of the phenomenon of the emergence of the human mind. After all, our ability to respond religiously to ultimate questions in worship and prayer is deeply embedded in exactly our species' symbolic, imaginative nature.

Most important for theology, if scientific contributions to understanding the issue of human personhood are taken seriously, the theological notion of the *imago Dei* can be powerfully revised as emerging from nature itself (see van Huyssteen 2006). For the theologian this interdisciplinary move implies that God used natural history for religion and for religious belief to emerge as a natural phenomenon. To think of the image of God as having emerged from nature by natural evolutionary processes emphasizes our vital connection with nature precisely by focusing on our species specificity. The scientist may be enriched by learning how these powerful symbolic and religious propensities cannot be discussed generically for all religions but come alive only in the living faith of specific religious systems where they are augmented in ways that scientific methodology cannot anticipate. The sympathetic scientist would then want to acknowledge that there is more to embodied human personhood than science alone could explain. The theologian should have learned, however, that overly abstract, disembodied notions of human personhood not only conflict with the heart of his or her own canonical, textual traditions but could also dangerously isolate theological discourse by destroying the possibility of interdisciplinary dialogue.

Finally, seeing human personhood and emergence as relevant topics for interdisciplinary dialogue reveals much about the nature of interdisciplinarity itself. The dialogue between the different partners in such an asymmetrical discourse as theology and science has strengths and weaknesses, possibilities and limitations. When science claims reductionist, scientific

worldviews as the only valid explanatory view, theology as a research strategy is by definition explained away, and all possibility of further interdisciplinary communication ceases. But with theology it is even more complex: interdisciplinary dialogue ceases to exist when overly particularist theologies retreat consciously from interdisciplinary dialogue but also when theology leaves behind the particularity of its own tradition(s) in favor of an abstract, generic religious metaphysics. In addition, interdisciplinary dialogue always points us back again to the broader boundaries of our own disciplines where disciplinary lines of argument necessarily diverge again and move back to *intradisciplinary* contexts, carrying with them the rich interdisciplinary results of the multidisciplinary conversation.

Most important, theology and the sciences can share concerns and indeed converge in their methodological approaches on specifically identified problems like the problem of human personhood and emergence. But precisely by also recognizing the limitations of interdisciplinarity, the disciplinary integrity of theology and of the sciences will be honored. The most challenging aspect of an interdisciplinary dialogue between theology and the sciences, therefore, may be for theology to lift up the specific limitations of this conversation. This implies a quite specific appeal from theology to the sciences, an appeal for a sensitivity to that which is particular to the broader nonempirical or philosophical dimensions of theological discourse.

NOTE

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1. See Clayton 2004, 97, for a discussion of how autopoietic or “self-forming” processes, as the “principles of life,” function in the opposite direction of entropy and contribute to overall progression toward thermodynamic equilibrium, although the second law of thermodynamics always wins in the end.

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