# THE EVOLUTION OF CONSCIOUSNESS AND THE THEOLOGY OF NATURE

*by Gregory R. Peterson*

*Abstract.* Theology and philosophy have traditionally assumed a radical split between human beings and the rest of creation. Philosophically, the split is usually justified in terms of a *locus humanus*, some one cognitive trait that human beings possess and nonhuman animals do not. Theologically, this trait is usually identified as that which makes us in the image of God. Research in animal cognition, however, suggests that we are not unique in as many respects as we think we are. This suggests that we rethink the idea of the image of God. In light of this, I propose that we think of nature itself as being in the image of God, with humankind as part of the broader natural and theological process.

*Keywords:* cognitive ethology; cognitive science; consciousness; René Descartes; emergence; human uniqueness; image of God; *locus humanus*; mind; Irene M. Pepperberg; Elizabeth Sue Savage-Rumbaugh.

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There has been a growing number of references in the past few years to what is generally called the "common creation story." This story, roughly speaking, goes as follows. Somewhere between seven and twenty billion years ago, the universe began its expansion from an infinitesimally small space-time point. In the first few seconds, the basic constituents of our material universe formed and, over the next several billion years and through an intricate series of steps, coalesced into nebulae, galaxies, stars, and eventually planets. On one particular planet (and perhaps on others), life emerged through a yet more complex series of events that still defies

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satisfactory explanation—although we have several serviceable hypotheses. Through the processes of natural selection, life evolved into manifold species, eventually producing human life forms, among others. As human beings, we are able to gaze at and, if only slightly, comprehend this process, realizing that it is not over but ongoing. Life is still evolving, although at a pace too slow for us to perceive directly. The universe is also evolving after its own fashion, and current theory suggests scenarios for its fate that range from heat death to a big crunch of one form or another. The universe, beginning with a bang, appears to have a less than glorious future.

Versions of this scientifically informed account have been embraced by a number of theological thinkers, particularly those engaged in the theology of nature—most explicitly, Sallie McFague (1993). It is taken for granted in this scenario that human beings are a natural product of this process, although exactly how we came to exist on this planet may be regarded in part as the result of divine action of one form or another, from Gordon Kaufman's "creative serendipity" (1993) to Arthur Peacocke's "loaded dice" (1993). Such an approach is in contradistinction to much of what has passed before in theological thought, which has either emphasized a supernatural dualism or (more officially) recognized the psychosomatic unity of mind and body but treated, nevertheless, humankind as ontologically and theologically unique and separate from other forms of life.

One would expect these theologians of nature who recognize our natural origins, then, to de-emphasize our uniqueness and emphasize instead our continuity with the natural world and particularly with other animals. With a few exceptions, however, this has not been the case; and while many theologians now concede our continuity with the natural world, there remains much to be explored, particularly in regard to our relation to other cognizing animals.

Research in the cognitive sciences, and particularly in cognitive ethology, suggests that we are not unique, as we have claimed, and that many of the cognitive features that we thought made us unique we in fact share with a wide variety of other creatures. But if we are not cognitively unique, are we theologically unique? Are we alone the subjects of salvation or of divine interest?

What will be sketched here are (a) an argument showing that we are not cognitively unique in any absolute sense and that we share a range of attributes with other animals, particularly primates, and (b) a reinterpretation of two Christian concepts—salvation history and the image of God—in order to take into account this continuity. This theological reinterpretation is a tentative one, but something like the accounts given here must be developed if we are to take both the naturalization of mind and animal cognition seriously.

## The Uniqueness of Human Beings and the Idea of a *Locus Humanus*

What is it, after all is said and done, that makes us human? Is there some quality essential to being human that firmly and distinctly separates us from all other creatures? Is there some one thing by which we recognize another as our equal? This is what I shall refer to as the question of the *locus humanus*.

Historically, Western thinkers have argued for such a *locus humanus*. Already in the fourth century B.C.E. Aristotle argued that it is rationality that makes humans unique ([ca. 335–322 B.C.E.] 1945, 1.7). Aristotle's influence in this respect lay heavily both on philosophy and theology up until the Enlightenment, when newer philosophies of mind began to be put forth.

In the modern period, the main criteria for distinguishing human beings from animals are primarily attributable to René Descartes ([1637] 1968; Peterson 1996). These are rationality, language, consciousness, and self-consciousness, with the former two implying the presence of the latter two. Descartes particularly championed reason and language as definitive, visible marks of human uniqueness. Animals may appear clever at particular tasks, but they are not reasoning when they do so. Parrots may mimic particular words, but they do not express any thought thereby, whereas even humans who are unable to speak devise sign languages by which they communicate (Descartes [1637] 1968, 72–75). Lacking both reason and language, animals are said by Descartes to be nothing more than sophisticated machines, devoid of consciousness and self-consciousness. Human beings, however, possess all of these traits.

Many rejected the Cartesian beast-machine thesis in Descartes' day, and even Descartes himself did not clearly endorse all the consequences entailed by it (Harrison 1992, Rosenfield 1968). Even so, the criteria that Descartes used are the ones used today in various forms by different authors. Of these, consciousness and self-consciousness are usually taken to be the crux of the issue, with rationality and language serving as empirical indicators of their presence. Self-consciousness has, in recent times, served particularly as the last bastion of human uniqueness; so whereas some authors deny consciousness to animals, others admit some degree of consciousness but deny self-consciousness to all but human beings (Dobzhansky 1974; Popper and Eccles 1977; Fox 1986; Rodd 1990).

Inasmuch as philosophy influences theology, such opinions have been true of theologians as well. Irenaeus and Thomas Aquinas, for instance, both allowed rationality to human beings alone (Irenaeus, *Adversus Haeresies* 5.6.1; Aquinas, *Summa Theologia* 76.1). Friedrich Schleiermacher, not surprisingly, saw self-consciousness as our unique feature, granting only a lower form of a "confused animal grade" of consciousness to other creatures

(Schleiermacher 1986, 18). Other theologians have often made similar claims, and some, such as Barth, have eschewed the question altogether.

Frequently, this *locus humanus* is identified as the image of God, often with the result of merging theological and philosophical perspectives. Thus, for both Irenaeus and Aquinas, it is precisely rationality that constitutes the image of God. Schleiermacher suggests as much also for the role of self-consciousness. Even philosophers were willing to posit such an identification. Both Descartes (1968) and Gottfried Leibniz ([1714] 1930), for instance, interpret the image of God in terms of mental attributes which they each consider to be unique to human beings. The image of God, then, has often served as a theological interpretation of the *locus humanus*, usually identified with one of the previous four criteria and given further theological justifications.

The concept of a *locus humanus*, therefore, has had both its philosophical and theological expressions. Philosophically, it has been put forth in terms of one of (usually) four quite specific cognitive traits, with this one trait being what distinguishes humanity from all other creatures. Theologically, the approach has been much the same, with the added interpretive structure of the image of God playing a key role for bridging philosophical and theological frameworks.

The task, then, is to indicate how these qualities are not unique to humankind and that, indeed, we share them to some degree with other animals in the natural world. To do this, it is necessary to consider first how the mind can be considered a natural phenomenon at all.

## The Naturalization of Mind

The phenomena of consciousness and self-consciousness have increasingly come to the forefront of thought, not only for philosophers but for scientists as well. The waves of behaviorism and positivism that swept through the sciences and Anglo-American philosophy during much of the current century (and persist in some circles even today) typically forbade the questions regarding consciousness (or mental content generally) even to be asked. Such questions were either considered unscientific or, worse yet, meaningless hangovers from a more superstitious and less scientifically informed age.

In recent decades this has changed, with the past ten years especially seeing an explosion in the study of consciousness by philosophers and scientists across a number of disciplines. The influence of both behaviorism and positivism has waned as their limitations have slowly become apparent and the benefits they promised have failed to materialize. In many circles behaviorism has given way to what may be called the cognitive revolution that has swept through philosophy and many of the sciences and that has been integral to the development of newer disciplines as well. These cog-

nitive sciences—which include neuroscience, cognitive psychology, computer science, and other disciplines—enthusiastically embrace mental content as a subject of study. Under the cognitivist paradigm, pioneering work has brought to light numerous perplexing questions regarding perception, decision making, and other features of the mind once often considered the exclusive domain of philosophy. (For a historical overview, see Gardner 1985.)

It is at this point that the concept of consciousness reenters the picture, for it has become clear that neither all that enters the eye, nor even all that is processed by the brain, is perceived by the experiencing subject. Furthermore, some events are persistently perceived or reasoned through incorrectly by tested subjects. A simple and intuitive way to explain these differences is by separating conscious perception and activities from unconscious or nonconscious activities of the brain. The simplicity comes from the neat way the idea of consciousness divides the activities of the brain and relates them to our overt behavior. We can give reports of only those thoughts or perceptions that are held consciously. Activities of the brain that we cannot give reports of are considered to be, at some level, unconscious or nonconscious. The intuitiveness of the idea of consciousness comes from our everyday life experience, for it is the case that most of us experience life in a fairly unified, narrative way. Indeed, it is the case that we experience life, period. On a commonsense level, we recognize a difference between ourselves and rocks, trucks, and thermostats. Things may happen to rocks, but rocks do not experience them happening. Furthermore, only a very few of us regard present-day computers to be in some way conscious—we distinguish the information processing that the computer performs from the information processing that we do, even if it is difficult to pin down in what way or why our processing is different.

Consciousness, in the sense above, means primarily subjective experience. There are a variety of states that we recognize as conscious states: walking down the street, fantasizing about an upcoming vacation to Florida, watching television and worrying about whether we are watching too much television. Likewise, we recognize certain events or periods during which we seem to lose consciousness, as when we receive a blow to the head or fall into a deep sleep. We even recognize that we can perform some tasks without the aid of consciousness, such as driving a car along a familiar route or performing very tedious and repetitious assembly work. Other activities, such as sleepwalking, are questionable, for if we were conscious of them we usually have no memory of them afterward.

Although there is occasionally some difference in the ways the term *consciousness* is used by different thinkers (Natsoulas 1978, 1983), the preceding discussion may be taken as a first-line working definition that is common among most working in the field currently. If one takes a cross section of such radically diverse thinkers as John Searle (1992), Roger

Penrose (1989), Roger W. Sperry (1976), David Chalmers (1996), and Paul Churchland (at least in his latest work, 1995), one will find much the same sort of catalogue of experiences with only some minor variation. While a formal definition of consciousness seems lacking and, indeed, may not be possible, there seems to be little difficulty discerning what is at stake.

The question remains, though, of how we account for the presence of consciousness. The cognitivist approach attempts to account for the mind in naturalistic terms. By definition, this excludes supernaturalistic accounts of mind, specifically supernatural mind-body dualism. Descartes is usually chosen as the primary representative of this view, although there is some range of options within supernatural dualism, from the three-tiered body-soul-spirit accounts prevalent in some Christian traditions to the parallelism of Nicolas de Malebranche.

Supernatural dualism, as conventionally understood, separates the causality of the mind (and, one might argue, particularly consciousness) from that of the body in favor of nonmaterial substance. From an empirical standpoint, supernatural dualism posits the known but ill-understood in terms of the unknown, the mystery of consciousness in terms of an immortal soul.

There are good grounds, however, for believing supernatural dualism is wrong, even beyond Descartes' intractable problem of how the two substances interact. Current neuroscientific knowledge associates quite specific mental activities, including the language and reasoning abilities presumed to belong only to the soul, with quite specific areas of the brain, so that any nonmaterial soul would have to be in contact with these separate areas simultaneously. It is not simply the case that when a person receives a blow to the head, the soul is temporarily disconnected from the body and is able to go about its business until the body recovers. The soul is knocked out, too. Drugs that alter the chemistry of the brain alter conscious states as well.

Even to mention supernatural dualism would be unusual for most interlocutors involved in the cognitive sciences and the philosophy of mind, but I do so for a couple of reasons. First, a good part of the public, particularly the religious public, still subscribes to some form of supernatural dualism. Secondly, the denial of supernatural dualism is sometimes taken to imply denial of all supernatural claims, most notably claims about the existence and nature of God, so to speak of the evolution of consciousness and the theology of nature in the same breath would strike some as engaging in a hopeless contradiction.

This is not the case, for the simple reason that the grounds for theism (the various arguments for the existence of God, religious experience, and existential considerations) are quite different from those for supernatural dualism. And, as has been widely pointed out, Christian scripture and the majority theological tradition has consistently rejected supernatural

dualism in favor of a more holistic account of human nature, emphasizing spirit rather than soul and the resurrection of the dead over immortality.

In siding with the cognitive sciences, then, we are siding with a naturalistic account of consciousness. By naturalistic, we mean in terms of known or possible quantities as described by the sciences, even if the account must leave some areas incomplete or take a ticket on the future, hoping that new empirical discoveries will confirm the theory posited. The question, however, remains: Which naturalistic account should one go with?

Diverse positions are held today, but versions of functionalism are the mostly widely held among interlocutors in the philosophy of mind and the cognitive sciences. Functionalism, at least as originally expounded, relies heavily on the hardware-software distinction made in the computer sciences. It is not surprising, therefore, that functionalism gathers much of its strongest support from the artificial-intelligence community and like-minded philosophers. For functionalists, mental events consist in functional relations in the flow of information. This includes consciousness, which may be variously identified with the flow of information generally —à la Dennett's tongue-in-cheek suggestion that thermostats are conscious (1987) or with a certain kind of information flow. As with much else in functionalist theory, what kind of information flow results in consciousness is a matter of dispute, although a very interesting and informative one (see Dennett 1991; Baars 1988).

Since its inception, functionalism has in many ways become quite diverse, and it has been severely critiqued from several perspectives (see Dreyfus 1979; Searle 1984; Penrose 1989). To address such criticism, I wish first to say a few positive things about functionalism. At some level functionalism must be true. The firings of neurons, despite certain important differences, are very much analogous to the binary operations of a computer, although the brain operates much more like a parallel distributed processor than the familiar serial processors that sit on our desk tops. In many ways, then, the operations of the brain are the operations of a very sophisticated biological computer, and certain brain processes in particular (such as visual processing) are very amenable to a computational approach (see Churchland 1995).

Having said that, however, it needs to be remarked that it is not yet very clear that functionalism explains everything, especially consciousness. It may be the case that functionalists will pull this off, but it is not clear that they have done so yet, and the harshest criticism of functionalism has centered around issues pertaining to consciousness. While many regions of the brain are associated with quite specific cognitive functions, no one region (so far) can easily be said to be the seat of consciousness, although there are some regions without which conscious functioning is impossible.

It is for this reason that I turn to an emergent account of consciousness that has been promulgated by many scholars, most of whom are working

out of the philosophy of biology or allied fields. Rooted in early turn-of-the-century criticisms of reductionist interpretations of both science and the mind (see especially Broad 1923), its modern form of argument is tied closely to the development of the philosophy of biology as a distinct subject area and a revolt of many of its thinkers against the overly reductive philosophy of science of that time (Thorpe 1962; Beckner 1974; Campbell 1974; Mayr 1988) but frequently concerned with the problem of consciousness as well (Popper 1974; Sperry 1976, 1983; Peacocke 1976).

Emergent holism is, first and foremost, an account regarding the relation of scientific theories to one another and to the world. From an ontologically reductionist point of view, all things are atomic particles and nothing but atomic particles, and ultimately the only true explanation is one that is given in terms of the motion and interaction of these particles. Reductionist accounts are hampered by, among other factors, the fact that our knowledge of even particle physics is incomplete (atoms are composed of protons are composed of quarks are composed of . . .) and the fact that it is computa-tionally impossible to predict the behavior of macroorganisms simply on the basis of the laws of physics. More to the point, such an account would probably be uninteresting in any case, as the type of questions asked concerning biological organisms (for instance) are biological questions (such as niche, natural selection, and fit) and not simply physical questions (such as motion, energy, and force).

Karl R. Popper (1974), for instance, has taken a chronological approach to explicating the idea of emergence. Referring back to the common creation story, the early phase of the universe was governed solely by the formation of particles and their gradual interaction and accretion into stars and other cosmic phenomena. In this early phase the only type of explanation available is one in terms of physics and chemistry. With the appearance of life, however, a new type of explanation is possible, because a new form of matter is present. These emergent laws (natural selection, transmission of genetic information, cognitive representation of the environment), while being bounded by the laws of chemistry and physics (as we know them), are not fully describable in terms of those laws. On top of the template of physics and chemistry can be laid a further template of biology. These laws and phenomena, as such, are in hierarchic relation to one another, and it can be fruitful to speak of interaction between different levels of organization by the exchange of energy and information.

This opens the door to speak of "top-down" causation, in which higher-order realities affect lower-order ones by what has become known as top-down causality. Campbell (1974) uses the now well-known example of the jaws of a soldier termite to explicate this relation. The soldier termite's jaws are so specialized that these creatures cannot feed themselves but must be fed by other termites in the nest. The explanation of the soldier termite's evolution cannot be given solely in terms of the evolution of an individual,

but of the termites as a society. This social evolution in part determines the evolution of the individuals, so it may be said that the higher-order laws governing social interaction exert a downward causality upon the lower-level laws of individual evolution. Such causation, moreover, is not a violation of lower-level physical laws but is rather bounded by them. In this vein, Peacocke speaks of downward causation in terms of a flow of information to be contrasted with the upward causation in the form of energy (Peacocke 1993, 59).

The conscious mind seems an excellent example of an emergent reality that effects a top-down causation. On the one hand, much of the activity of our minds can be described in terms of its neural correlates, as the recent images derived from CAT and PET scans dramatically demonstrate. Phenomenologically, however, we—the actual conscious minds—operate on our own level of reality and readily engage in decision making, questioning, and other activities, which cause the motion of our limbs, which in turn affect in various ways the environment around us. The changed environment in turn affects us, and we go through the cycle again. The higher-order events of our minds thus impinge on lower-level events (the motion of a car), which then affect the very mind that caused the set of circumstances to come about.

> In brief, the new answer [for a causal view of consciousness] hypothesizes that conscious experience appears in the causal chain of brain activity at upper (i. e., cognitive) levels of brain processing in the form of irreducible emergent properties. These emergent mental entities are conceived to interact on a holistic, "functionalistic" basis at their own cognitive level in brain integration, and also to exert a concomitant supervenient form of downward control over their constituent neurocellular activities. . . . In effect, the mind is put back into the brain of objective science. (Sperry 1991, 243)

One is here reminded of Leibniz's thought experiment in the *Monadology* of a person who is shrunken and takes a walk through the machinery of the brain, only to find no consciousness there. From the perspective of emergent holism, no mind can be found by simply examining neurons, because in such an examination we are engaging the wrong level of analysis—although examining the neurons may tell us much about how the mind works. In this sense, the conscious mind is real, but it is an emergent reality. The mind is not identified with any one area of the brain but with its operation as a whole.

As given here, an emergent account of mind explains much but leaves out much as well. It allows space for the reality of consciousness that is more satisfying than many functionalist and other reductionist accounts but does so at the price of specificity. The danger of adopting the perspective of emergent holism is in becoming too complacent about different levels of reality without taking seriously how they interact (what neural correlates, for instance, are necessary for consciousness, and what are not?)

or how new theories at the same level may replace old ones. Emergent holism does not give us so much a theory of consciousness as a framework within which to pursue the study of it. It provides a way for understanding how consciousness and self-consciousness may be natural phenomena, even though we do not yet (and perhaps never will) fully understand their underlying causes. But if we can accept the fact that consciousness and self-consciousness are naturally occurring, in what sense can we regard them as unique to humankind?

## Cases from Cognitive Ethology

Having shown reasons to believe that consciousness occurs naturally in the world, I wish to consider some examples of research in the field of cognitive ethology that would lead us to believe that some animals, as well as human beings, possess some level of reasoning and linguistic ability and, thereby, some degree of consciousness and self-consciousness.

As a discipline, cognitive ethology is devoted to the study of the cognitive aspects of animal behavior (Griffin 1978; Ristau 1991). In practice, this can cover a fairly broad spectrum, including animal reasoning abilities, internal representations (or, for the skeptic, "representations") of physical or social environs, decision making, memory skills, problem solving, tool making and use, communication, and, in the case of primates, language and protolinguistic abilities.

Cognitive ethologists have at times sharply emphasized a divide between their approach and the older behaviorist approach, which has dominated biology in the twentieth century. Behaviorism, in its strict form, dismisses all explanations that refer to intentional or mental states in favor of strict stimulus-response explanations. Concepts such as goals, problem solving, desires, and intentions have no place in the behaviorist framework. The result of this has been twofold. On the one hand it has allowed progress in certain areas of research, but on the other the scope and significance of that progress has been severely truncated, in that the behaviorist methodology has disallowed the very questions that some researchers most want to ask. Cognitive ethology, by contrast, openly theorizes about mental states, including on occasion the more abstract categories of consciousness and self-consciousness. In some cases, this break with behaviorism has been sharp, and Donald Griffin (1978) in particular has argued vociferously against the "behaviorist zeitgeist." But cognitive ethology owes a methodological debt to behaviorism in that it attempts to maintain much of the same experimental rigor, using extensive documentation and, where possible, quantitative testing procedures. In this vein, cognitive ethology has proceeded along a line of development similar to that of other fields within cognitive science, most notably cognitive psychology.

This is not accidental, for cognitive ethology has not developed independently from the other fields involved in the cognitive revolution. Inasmuch as cognitive ethology is concerned with mental capacity and brain development, it has interacted with neuroscience; questions of animal communication and language have led to discussions with both linguists and developmental psychologists; and of course the foundational issues of defining the nature and scope of the concepts being studied have also led to interactions with philosophers. (Many of these issues are covered in Griffin 1992.)

It might be best to begin, however, by stating that it is not obvious that all animals possess consciousness and that many probably do not. The behavior of insects, for instance, seems to be rigidly programmed. A digger wasp, for instance, will place its secured prey in a specific position, dig a hole, and then place the prey in the hole. If, however, the prey is moved while the wasp digs, it will move the prey back to its original position and recommence the digging of the hole. If the prey is moved each time, the wasp will do so indefinitely without seeming awareness of what's going on.

Such rote behavior is common to many animals. In this sense, there seems to be some truth to Descartes' beast-machine thesis, for this type of behavior in animals is remarkably reminiscent of the rigid and formulaic behavior of computers, which we do not regard as conscious at all.

But not all animals behave in this fashion, and some seem to be able to engage in reasoning behavior of a kind very similar to our own. One such research project, involving an African Grey Parrot named Alex, has been run by Irene M. Pepperberg. Parrots have an interesting attribute absent in most other animals: they can talk. Because of the apes' inability to form words vocally, efforts in ape language have had to rely on symbol systems, either American Sign Language or one of several other symbolic devices. Pepperberg chose an African Grey Parrot because of the unusual vocal ability of the species and because birds generally go through a period of experimental vocalization in early youth, analogous to the way children babble before learning specific words.

Pepperberg set out first to teach Alex a usefully large vocabulary and then to test Alex's ability on a number of logical discriminations. Over the time span, Alex has learned words for more than thirty items, including objects such as paper, key, grain, chair, grape, wood, cork, knee, shoulder, and pasta. In addition, he has learned the words for seven colors (red, green, blue, yellow, orange, grey, and purple) and five shapes (two-corner [football shape], three-corner [triangle], four-corner [square], five-corner [pentagon], and six-corner [hexagon]). He has also learned the numbers 2 to 6 and is able to tell how many objects of a kind there are in a group (Pepperberg 1991).

Alex has also learned functional use of several "phrases," including *come here*, *wanna go X* (X refers to a chair or a large caged bird gym, knee,

shoulder, and so forth) and *want Y* (Y refers to cork or nut, for example). In addition, it appears that Alex is developing the use of *What* phrases to initiate conversations (*What's this?* or *What color?*).

We are, of course, accustomed to the picture of a parrot talking or even requesting the proverbial cracker. More unusual are the abilities displayed here. Alex can consistently identify one of several items familiar to him. He can count. He can express desires regarding objects or actions (Pepperberg 1981).

Beyond this, Pepperberg has conducted several tests regarding Alex's cognitive abilities. Surprisingly, Alex is able to perform several category tasks. In one series of tests, Alex was asked to identify objects based on one of four categories: shape, color, material, and quantity. Thus, Alex would be asked "What color?" or "What shape?" after which he was expected to give the correct response. At times only one category class would be in question. At other times the categories would be mixed so that "What material?" might be followed by "What color?" In some cases, the same object would be used, and the two or three questions would be asked successively. On these trials Alex had to know which information to give; if shown a blue star, Alex was required to answer appropriately either "blue" or "star," but not "blue star." Alex's responses on these tests scored above 80 percent—well above chance.

In a second series of tests, Pepperberg tested for the concept of same or different. These tests occurred in three sets. The first set used objects that were familiar to Alex but that he had not been trained with. For example, Alex might be given a red star and a red ball and then asked either, "What's same?" or "What's different?" In the second set the same procedure was used but with totally unfamiliar items. Thus, two objects might be colored, one purple and one pink. Alex did not know either color from previous experience but was still able to respond that it was in respect to color that the two objects were different. In the third set familiar objects were again used, but this time as a control to make sure Alex understood the different questions of "What's same?" and "What's different?" For instance, Alex would be shown two triangles made of wood (and therefore the same in two categories), but they were different colors. Alex would then be asked "What's different?" The parrot would need to be paying attention to the question to determine which answer to give, because the items were the same in two dimensions but different in only one. Furthermore, the three sets would be run interchangeably, so that a familiar object might be followed by an unfamiliar object, or a "What's different?" question might be followed by a "What's same?" question.

The percentage of correct answers by Alex for all trials was 76.7. Contrary to expectation, Alex actually did slightly better on the novel items than the familiar ones, and Pepperberg speculates that this was because they were more interesting to Alex because he had never seen them before

(typically, Alex is given an object after he has performed the task).

The question, of course, lies in the interpretation of the data. Has Alex displayed either linguistic or rational behavior? As always, there are limits to experimental methods that can be called into question. So far, Alex is unique—no one else to date has tried similar experiments with parrots. Then there is the problem of cueing—the inadvertent tipping off the subject to the right answer either by facial expressions or other body language. Pepperberg, however, has been fairly cautious in her approach and uses someone relatively unfamiliar to Alex to actually perform the testing.

From these tests it would appear that Alex possesses minor rational and linguistic skills. There are, of course, many things that Alex cannot do. His vocabulary is limited to about thirty words, and he cannot combine them grammatically as far as we can tell (the phrases he does use are likely memorized as units). But the modesty of these skills should not detract from how remarkable they are. If we regard the possession of rationality and language, even at a low level, as implying consciousness, then Alex is conscious, although his conscious experience may not be as rich as our own.

A second research effort has been pursued by Elizabeth Sue Savage-Rumbaugh in the area of ape language. Much of the previous research on ape language had been controversial, in part because of sloppy methodology that could not support the claims of the researchers (for an evaluation of this research, see Wallman 1992). Savage-Rumbaugh's work has largely escaped this criticism and has received recognition in many quarters, particularly in her work with a bonobo named Kanzi.

The bonobo (*Pan paniscus*) is a recently rediscovered species of primate, also known, misleadingly, as the pygmy chimpanzee. Found only in central Zaïre, the bonobo differs from the closely related chimpanzee in several significant ways. It is perhaps the most inclined to bipedality of all the apes; more sociable, more intelligent, and less violent than the chimp; and it uses sex not only for mating but also for social bonding and in exchange for food.

Savage-Rumbaugh's first work with bonobos was with a female named Matata, who was already of childbearing age at the time. Prolonged work with Matata, however, seemed to provide minimal results, perhaps because of her age, and so she was eventually transferred out of the program. Matata had an adopted offspring, Kanzi, who was six months old when Matata's training began and 2-1/2 years old when his mother was transferred and his own instruction began. Kanzi had been present, for practical reasons, during Matata's own training, although he had never actively participated in the training itself and, indeed, often served as an interruption to it.

On the first day of training, something remarkable happened. Kanzi started to use the keyboard without prompting and was apparently using the symbols correctly. Savage-Rumbaugh recounts:

For example, one of the first things he did that morning was to activate "apple," then "chase." He then picked up an apple, looked at me, and ran away with a play grin on his face. Several times he hit food keys, and when I took him to the refrigerator, he selected those foods he'd indicated on the keyboard. Kanzi was using specific lexigrams to request and name items, *and* to announce his intention—all important symbol skills that we had not recognized Kanzi possessed. (Savage-Rumbaugh and Lewin 1994, 135)

Subsequent testing confirmed the first day's impression. Kanzi, without any formal training, had learned to use at least eight symbols and could use them not only to request objects but to announce future actions. This revelation, that a young ape could learn to use symbols without formal training, much as a human child does, prompted a revision of the training methodology by Savage-Rumbaugh, from a formal method to a more laissez-faire approach. Savage-Rumbaugh used the wooded land behind the labs for Kanzi's learning experience. This area included seventeen sites connected by paths. Each site had a distinct symbol and housed a different kind of food or item so that Kanzi could refer to each site either by the food or the name of the site. The learning of symbols was developed to a significant extent, then, in terms of Kanzi's own interests and inclinations. This involved a significant contextual component. Indicating tree house on the keyboard, for instance, entailed a walk (sometimes up to thirty minutes for some locations) to the tree house where juice was typically found. Once there, other activities might take place—chasing, tickling, or the learning of the symbol for clover. By the end of four months, Kanzi had learned to use twenty symbols in this way, and about fifty after sixteen months (Savage-Rumbaugh et al. 1986). In one important trial Kanzi was allowed to go into the woods with Mary Ann, a member of the research center unfamiliar with the trail system (so that she did not know the correct routes) or the specific research effort (so that she could not give cues on the meanings of the symbols). Kanzi announced his intention on the keyboard and then accurately led her to fifteen of the seventeen sites. Mary Ann then requested to go to the two remaining sites, to which Kanzi promptly led her also. Kanzi could thus use the symbol system in the absence of immediate stimuli to announce intended activities and could then correspondingly carry them out.

Kanzi's linguistic abilities thus improved consistently over the period of time studied. Not only was he able to use the symbols to name objects and actions; he could also announce his intended actions before carrying them out, a feature not tested for and apparently lacking in previous research. In accord with Savage-Rumbaugh's approach, comprehension of symbols preceded use of them, a pattern paralleled in human psychological development. Furthermore, Kanzi meaningfully combined both gestures and symbols and two or three symbols together. For instance, he would depress the symbol for ice water and point in the direction of the refrigerator, indicating "go get ice water." Even more interesting, Kanzi on occasion

would verbalize phrases that did not directly involve him. Savage-Rumbaugh states: "Kanzi might indicate grab chase at the keyboard, and then take one person's hand and push it toward a second person: the chaser and the chasee. Statements of this sort were Kanzi's own inventions, as none of us suggested we play with each other, leaving Kanzi as spectator" (Savage-Rumbaugh and Lewin 1994, 146).

After this period of research, Savage-Rumbaugh tabulated her data and called in a linguist, Patricia Marks Greenfield, to examine the syntax of Kanzi's multisign utterances. Using standards developed across previous ape-language research, developmental psychology, and linguistics, Greenfield and Savage-Rumbaugh concluded that Kanzi's utterances did have grammatical form (Greenfield and Savage-Rumbaugh 1990). That is, Kanzi's symbol-symbol combinations and symbol-gesture combinations produced meaningful units, followed rules of word order and category, and allowed the formation of novel, albeit two-word, sentences.

Over the course of the research, it had also become increasingly apparent that Kanzi could understand words and phrases of English, to such an extent that in some cases Kanzi would sometimes use the keyboard to light up words he had heard, while on other occasions the researchers sometimes felt compelled to spell out words when in Kanzi's presence when they didn't want him to know the subject of conversation. It was decided to test Kanzi's ability to comprehend spoken language. The first testing session involved the identification of thirty-five words. Kanzi would be given an array of three pictures and lexigrams and then asked to identify what had been said. Kanzi was not trained in the exercise, nor was he rewarded, but he still made correct identifications in 95 percent of the 180 trials (Savage-Rumbaugh and Lewin 1994, 148–9).

A further set of trials over nine months tested the comprehension of 660 sentences. This test was simultaneously performed with a human child, Alia, 1-1/2 years of age. Sentences typically took the form of requests, such as "Put object *x* in (or on) transportable object *y*," "Give object *a* to individual *c*," "Do action *a* on object *x*," and so forth. In addition, every effort was made to use statements that were unfamiliar to both, such as "Put the paint in the potty." As a whole, Kanzi performed the actions accurately on 72 percent of all trials and Alia performed accurately on 66 percent (Savage-Rumbaugh et al. 1993). Many of the errors that did result were often partial errors or resulted from inattention or distraction on the part of Kanzi or Alia. Even so, the scores of both are well above chance, demonstrating Kanzi's knowledge of the names of more than eighty objects and their grammatical relationship in a sentence.

Despite the variety and the depth of the evidence, it can still be asked, Does this really constitute language? Some continue to remain dismissive of the research, despite its thoroughness and the detail of its claims. Savage-Rumbaugh argues, however, that this way of thinking is misleading.

The question is not whether or not apes have language but at what stage and at what complexity language appears and develops. Language and reasoning abilities do not appear whole cloth but are themselves composites of more basic abilities. To speak a language involves an understanding (often unconscious) of representation, syntactical rules, and phonemic units, just to name a few attributes. Patients with brain injuries can suffer quite specific deficits while other linguistic abilities remain unaffected. It is therefore not surprising that other animals may, under certain conditions, reveal some aspects of these traits.

If Descartes' argument that the presence of reason and language indicates the presence of consciousness and self-consciousness is correct, then Kanzi, like Alex, possesses consciousness and, perhaps unlike Alex, a degree of self-consciousness as well.

The problem in detecting self-consciousness lies in part in the definition of the term. Self-consciousness under various construals can mean consciousness of a self as distinct from others, the ability to objectify oneself in one's own consciousness, thinking about one's own thoughts, thinking about the facts of one's own consciousness, consciousness that one is a narrative self, and so on. It is usually argued that self-consciousness is a *thing*, that one has it or not; but a more careful analysis suggests that self-consciousness is a *range* of abilities and that even human beings have differing ranges of self-consciousness, and that people have different levels of self-awareness at any given time, depending on their mood, intelligence, education, and the like.

Kanzi is certainly aware of himself as distinct from others and can objectify himself to the extent that he can announce his own future actions. Kanzi can understand grammatical sentences and perform the tasks they indicate. Although one can overestimate these abilities, it is dangerous to underestimate them as well. We are used to thinking of ourselves as being cognitively unique, and to some degree we are. Kanzi cannot do calculus or play the piano. He cannot enjoy Shakespeare or play a good game of chess. Of course, many of us have difficulties with these tasks as well. It appears that we are in continuity with many other animals in being the possessors of conscious experience and even in the possession of various levels of self-conscious experience.

These two case studies, interesting as they are, can neither cover all the questions nor reveal the range of animal abilities revealed by cognitive ethology. Donald Griffin (1976, 1984, 1992) has compiled numerous relevant case studies. Nevertheless, the cases above do challenge the idea of a *locus humanus* most sharply, for they reveal that some animals have in a limited fashion those abilities that were once thought to be unique to humankind. But if we are not cognitively unique, are we theologically unique? Do we alone have a special relationship with God, or have we construed our relationship with God wrongly?

## THEOLOGY AFTER THE *LOCUS HUMANUS*

Much more can and should be said regarding the naturalization of mind and the presence and nature of animal cognition. My concern here, however, has been to give a somewhat sweeping overview of material that is not usually seen side by side in order to give a clearer picture of why we need to reevaluate certain core concepts in Christian theology, which has tended to assume, along with much of Western thought, a radical disjunction between the human and the animal, a disjunction seen philosophically in terms of a *locus humanus* and theologically in terms of the image of God.

If the doctrine of the image of God has been used to shore up the idea of human uniqueness, it may be this idea that most needs reevaluating. One approach would be simply to include conscious or self-conscious animals in the circle of those in the image of God. I wish, however, to suggest a more comprehensive reinterpretation and to change the locus of the image of God from human beings to nature. Thus, while not denying that human beings are in the image of God, or perhaps even especially in the image of God, the idea of nature in the image of God allows for a more inclusive understanding of the relation of the world, animals included, to the divine.

The phrase *image of God*, despite its theological importance, occurs surprisingly infrequently in Jewish and Christian scriptures. In Jewish scripture it occurs a mere three times, only in the book of Genesis (1:26, 5:1–4, 9:6–7) and only in the Priestly source. Since the latter two occurrences are essentially references to the theologically pregnant first, we have essentially a single reference for the phrase *image of God*. Despite the long theological history linking the image of God to a cognitive trait, modern biblical scholars link it more to responsibility. Human beings are, in essence, God's viceregents on earth, as stewards over a plantation (for example, von Rad 1972).

To state that nature is in the image of God seems to go against the grain of this tradition, but I am not sure. To state that nature is in the image of God does not abrogate humanity's image. If anything, it makes it more explicable. Human beings are indeed part of the creation they care for and support, not alien to it.

Indeed, in the New Testament, the idea of the image of God undergoes a dramatic change; passages such as 2 Corinthians 3:18 indicate that the image of God is something we *become*, not something that we are. This dynamic imagery is even more pertinent to conceiving of nature as being in the image of God. It emphasizes not only the *is* or *is not* of any metaphor but also that the relationship between *is* and *is not* is always changing.

The idea of conceiving of nature as being in the image of God has received only marginal treatment in the theological tradition at best, and that has occurred within the past few years. Philip Hefner (1993) thus remarks that "It is the anthropocentrism of the concept of the image of

God that requires revision today" (p. 239). Similarly, McFague, in developing a theology based upon the "common creation story" provided by the sciences, states, "In this story we are not a little lower than the angels, nor the only creatures made in the image of God: our particular form of grandeur is in relation to the earth and derived from it—we are the self-conscious responsible creatures" (McFague 1993, 113).

As far as the image of God goes, these statements are left undeveloped, suggestive though they are. Langdon Gilkey (1994), however, has taken up a fuller exposition of what he calls the "theologically deviant" idea of nature in the image of God. While Gilkey acknowledges that heretofore the idea of an *imago dei* has been attributed exclusively to humankind, he argues: "Nonetheless, it is, I believe, important to suggest that nature also represents an *imago dei*, an image and likeness of its creator. This point is important because if nature be in truth an image or mirror of the divine, then—as is the case with humans—nature has an integrity in itself, a value for itself. . . . In this context, image is taken to mean a sign, symbol, or sacrament of the divine, disclosing through itself the divine glory" (Gilkey 1994, 489).

What is it about nature, then, that images God? Within most theistic frameworks, we postulate the God-world relationship in terms of the Creator and the created. God is immanent in that God is present everywhere and everywhen, represented by the conceptualization that the world is within God. God is transcendent in that God and the world are not identical and that God is a greater reality of which the world is a part.

What, then, does imaging mean in the context of Creator and created? Presumably, in the created, there are telltale characteristics of the Creator. A potter is known by the quality and style of pottery produced, a painter by the choice of subject, coloration, and representation. Peacocke's (1993, 172–77) metaphor of God as a composer returns to mind at this point. A skilled listener can instantly identify whether a piece is by Mozart, Beethoven, or for that matter the Beatles. In each case there are identifiable traits that characterize the work of that composer. So too should we regard the world, being created by God, as likewise being in the image of God. Such an image should manifest itself in different ways. But in what does the image of God consist? What characteristics of God are reflected in nature, in animals, in ourselves? Surprisingly, a number of traditional categories come to mind.

Nature is good. Indeed, this statement is among the first statements in the Bible. This goodness can and should be seen as a reflection of its Creator. In this sense, we may also say of the natural world that it has intrinsic value, from sediment to sea slugs to seashores. The land and the animals have value independent of us, for in their beauty and complexity they reflect, if indirectly, the hand of their Creator.

Nature betrays orderliness. In attributing to God rationality, the Christian tradition is affirming a number of things. On the one hand, it is affirming God's reliability and faithfulness—that God, in traditional covenantal language, keeps promises and that the God of justice that we relied on yesterday is the God of justice that we rely on tomorrow. It is also affirming reason over chaos. We may recall again the first chapter of Genesis, in which God's word brings an ordering pattern out of the chaos of the deep.

As God orders things, so is nature orderly. The natural world, in terms of its most basic building blocks, follows general laws and patterns that can be systematically described and investigated. Even at higher levels of description, we may see these same types of orders and patterns, albeit in more complex forms, as in the laws of natural selection, ecology, or economics.

God, in the Christian tradition, is recognized at some level as a personal agent. Nature too becomes personal in the emergence of life. The evolutionary processes of nature produce cognizing creatures that are conscious and, to varying degrees, self-conscious. Indeed, the emergence of consciousness and self-consciousness may be considered the end result of the other relevant processes of nature: orderliness, complexity, and novelty.

The emergence of self-conscious creatures provides a new range of the imaging of God. The God who loves and creates is now mirrored, however imperfectly, in creatures that also love and create. In this sense it may still be relevant to speak of human beings as preeminently (to date) in the image of God, but to speak so from a remarkably different standpoint. Such a perspective does not give us "dominion" in the old sense of the word but in a sense closer to what may be the original biblical intent: caretaker or representative.

This is neither a definitive account nor an attempt to give an argument from design, as if one can argue directly back from nature to God. This does not (at this point) require a specific methodology or theological position. I have simply sought to show, if the image of God is reconceived in this fashion, links that can be made and the sort of values that are implied. God has imbued the world with Godlike attributes, from the simplest level to the most complex. Such imbuing reflects God's valuation of the world that in turn implies how we should value the world. In essence, this is what the image of God language is all about. When Genesis designates human beings as "in the image of God," a value relation and a scale among God, human beings, and the world is implied, with God at the apex and the world at the bottom (although still created good). If we conceive of the world as being in the image of God, one of the questions that should be asked is, Does this scale still hold? Are human beings worth more than other parts of creation? Or, more specifically, are humans worth more than bonobos, who are worth more than sea lions, who are worth more

than smallpox, which is worth more than rocks? There is a chain of being implied here. But the chain, from the cognitivist standpoint, can become confused. An adult, language-trained bonobo is more intelligent than a human infant. Is the bonobo worth more? Isn't it the height of human arrogance to assume that because we, in our mature adult stage, are a bit more intelligent than other creatures, we are more like God?

I do not suggest that there are easy answers to these questions, yet they need to be asked. Other interpretive options may be available and should be explored, but it seems clear that the old strategy of emphasizing the difference between human beings and animals and, indeed, the rest of creation, is no longer viable.

In like manner, we can turn from the idea of the image of God to the idea of salvation history, which has traditionally been assumed to be a *human* salvation history. It is human beings, according to the Genesis narrative of the Fall, who have sinned and are therefore in need of redemption. The rest of the creation, by and large, served merely as a backdrop to this preeminently human drama.

The majority theological tradition has tended to affirm the continued goodness of creation as unaffected by the Fall. In places, the Bible affirms this sort of interpretation. The Noah story seems to imply this, inasmuch as it is human wickedness that causes the flood and representatives of all creatures are carried on the ark (although the rest, it may be noted, perish with the rest of corrupted humanity). But Paul, on the other hand, speaks of the groaning of creation, leading to another type of interpretation in which the creation is caught up in the human drama—the creation too seeks redemption. This idea has been affirmed in various places in the theological tradition, by Irenaeus and by some contemporary thinkers as well (for example, Rolston 1991).

If we conceive of nature as being in the image of God, then the human-centered salvation history is no longer appropriate—it needs to be replaced by cosmos-centered salvation history. Such an interpretation can only be hinted at here, although some thinkers such as Pierre Teilhard de Chardin have provided such an approach.

Within the human context, salvation history is usually construed in terms of creation-fall-redemption. Two millennia of Christian thought have grappled with the meaning of such a schema for human beings. What does salvation mean for the world?

First we affirm of the natural world its *createdness*. With this, our orthodox conceptions are quite comfortable.

But second, we affirm of the world its, along with our own, *fallenness*. This concept, more than any other, may ring odd in most ears, even of those who have argued for cosmic salvation; yet we must have an understanding of the sense that we are proposing a nature-centered salvation history. In the traditional story of the Fall, we are placed in the Garden of

Eden, where Adam and Eve bite of the fruit against divine command and therefore receive censure and expulsion from the Garden. From the perspective of the theology of nature, such a literalistic reading is not adequate for the scope of our inquiry.

We may affirm, however, that while the world in its creation was made good, in consonance with Genesis 1 and Christian tradition, the fundamental freedom of the natural world, as characterized by natural laws discovered in the various sciences, allows for more than one outcome. By the fundamental freedom of the world, we mean primarily that its developmental history is a contingent one, allowing for many possible outcomes. In such a context the concept of fallenness denotes that the course of cosmic history results in less than the maximal possible good and that, indeed, evil is a necessary concomitant in the development of any life. The natural world, in its fundamental freedom, is capable not only of imaging but also of falling short of perfection in any particular chain of events. Leibniz argued that a necessary theological corollary is that we live in the best of all possible worlds. The theology of nature must affirm somewhat differently that, while the best of all possible worlds was created, the fundamental freedom given the world by God does not entail any longer that such is the case. If a comet snuffed out all life on earth tomorrow (as one or more nearly have in the past), we can clearly say that in this experiment nature has not developed to its full biological and cognitive potentiality. The creation would not thereby be made worthless, however, for it is quite possible that life exists around billions of other suns, that we are one of many products of natural laws at work, in which is seen the hand of God.

This fundamental freedom is considerably magnified with the emergence of conscious and self-conscious beings and, particularly, humankind. With the new level of complexity that self-consciousness allows, new levels of both good and evil are now realizable—as history has well shown. In this sense, one may still speak of physical and of moral evil—and, indeed, moral evil may be spoken of as an emergent form of physical evil.

Third, then, we affirm that salvation is necessarily not simply human, but cosmic. Under such an approach, redemption is not only redemption for human beings, but for rocks, trees, viruses, lizards, dinosaurs, otters, and dodo birds as well. As with fallenness, it is difficult to understand what redemption means in such a broad context. One perspective that would allow us to understand a cosmic redemption would be to see it as, in a sense, an emergent one. What does it mean, after all, for rocks to be redeemed?

Traditionally, salvation has meant salvation *from* something as well as *for* something. For human beings, salvation means salvation from our existential predicament, bound by sin whose wages are a physical and spiritual death. Salvation means a renewal from that death, both physical and spiritual.

To speak of the redemption or the salvation of nature is to speak of salvation from and salvation for. The salvation of nature, as a whole, is *from* its state of fallenness, from the path of less than perfection, and *for* the promise of a new or revitalized nature within God that will be wholly good and not fallen in this sense. Salvation, is not salvation of individual rocks or ribosomes but of the whole pattern, which is not forgotten but made new, much in the biblical image of the new Jerusalem.

Conscious beings, however, represent an emergent form of nature. Those incapable (or only marginally capable) of self-consciousness may be described as experiencing machines, in the sense that they cannot reflect on the morality of their actions but simply act in accordance with their needs, suffering pain and pleasure according to the limited allotment of their abilities. The emergence of self-consciousness, however, would appear to allow the increasing glimmerings of both moral guilt and moral responsibility until one reaches the whole gamut of human emotions and reasoning. For conscious and particularly self-conscious beings, salvation has much richer meaning: salvation from pain, suffering, and our moral failings, and salvation for a new life free of evil and full of new modes of awareness.

Again, other interpretations can and should be tried, as these ideas are proposed with an aim toward provoking our thoughts and realizing the shortcomings of previous conceptions. What does seem clear is the need to sufficiently realize the ramifications of the naturalization of mind and the weakening of human uniqueness. Any theology that takes the sciences seriously must take these claims seriously as well. We are not alone in the universe, nor are we aliens planted on a strange world. Rather, we are the product of a long, erring line of evolutionary development. To see this theologically is to see it again with wonder.

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