

RELIGIOUS METAPHORS: MEDIATORS BETWEEN BIOLOGICAL AND CULTURAL EVOLUTION THAT GENERATE TRANSCENDENT MEANING

by *Earl R. MacCormac*

Abstract. Humans can be described as existing somewhere on a descriptive continuum between the poles expressed by the metaphors "humans are machines" and "humans are animals." Arguments for these metaphors are examined, and the metaphors are rejected as absolute descriptions of humans. After a brief examination of the nature of metaphor, all metaphors are discovered to mediate (interact) between biological and cultural evolution. Contrary to the reductionist program of sociobiologists, religious metaphors that generate transcendent meaning offer a legitimate description of humans.

Each generation attempts to describe "human nature" in relevant terms derived from both an account of ourselves as humans and an account of the world in which we live. At one time, human nature was usually described in the Western world as an embodied soul temporarily existing in a transitory physical world, awaiting eternal life in an otherworldly heaven after death. Today, however, many describe human nature in nontheological terms either naturalistically as an animal or culturally as a machine.

This description is accomplished with the aid of metaphors, which relate two or more referents not normally associated and thus create a new understanding or new meaning for the reader or hearer. For something to be a metaphor there must not only be some analogy between the referents but also some dissimilarity; if there is no dissimilarity among the referents in the expression, it is a simple analogy and not a metaphor.

Sociobiologists describe humans naturalistically by adopting the metaphor "humans are animals," and they seek to demonstrate that

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human behavior can be reduced to animal behavior. Many cognitive psychologists and some philosophers describe humans culturally with the metaphor "humans are machines," and they seek to demonstrate that our mental behavior can be stimulated by a computer program. To be more precise, most contemporary accounts of human nature locate us on a continuum somewhere between the metaphors of "humans are animals" and "humans are machines." In *The Metaphorical Brain*, Michael Arbib explicitly invokes these metaphors.

We want to understand how people think and behave, and in particular we wish to understand the role of the brain in thought and behavior. In some ways the brain of a man is like the computer of a robot, in others it is more akin to the brain of a frog. Our aim here is to convey an understanding of the brain in terms of two main metaphors: The cybernetic metaphor, "Humans are machines," and the evolutionary metaphor, "Humans are animals." We shall not downgrade the differences, but we hope to learn much from the similarities.¹

These metaphors seem to leave little room for humans to exist in any dimension except that of a biological organism in a cultural context. Does this mean all religious metaphors will necessarily be reduced to cultural or biological phenomena? We shall argue that religious metaphors remove us from this cultural and biological continuum by generating a dimension of existence concerned with ultimate meaning. Religious metaphors allow us to transcend the limitations of biology and culture by suggesting a dimension of human reality different from that of the physical world alone. Religious metaphors, however, like all metaphors, mediate between the processes of biological and cultural evolution in which we find ourselves. Yet, they do more than just attempt to reconcile biological and cultural evolution; by their suggestive possibilities, they project man beyond the evolutionary process altogether. Religious metaphors make us self-conscious of the possibility of existing beyond the evolutionary process; paradoxically we humans never escape biological and cultural evolution and yet in the awareness of our participation in the evolutionary process, each of us may consider ourselves through a religious metaphor as a unique individual with an ultimate purpose other than that of biological transmission of the species or cultural accumulation of knowledge. In attempting to establish the plausibility of this highly speculative hypothesis we shall do the following: (1) argue that the metaphors "humans are animals" and "humans are machines" only partially describe our human nature, (2) briefly sketch a theory of metaphor that accounts for the use of these metaphors and for the development of religious metaphors, (3) argue that many metaphors mediate between biological and cultural evolution, and (4) suggest that religious metaphors mediate between cultural and

biological evolution in a very special way allowing for the possibility of a *transcendence* of the limitations of biology and culture.

THE ANIMAL AND COMPUTATIONAL METAPHORS

Sociobiologists have taken the metaphor “humans are animals” and attempted to show that social traits are inherited biologically and that man’s behavior can be reduced to a genetic origin. If they are successful, the expression “humans are animals” will no longer be a metaphor but rather will become a literal statement. E. O. Wilson claimed an analogy between the social insects and humanity and asserted that ethics, a form of human behavior seemingly most remote from an evolutionary origin, possesses a basic genetic determination.

But to the extent that principles are chosen by knowledge and reason remote from biology, they can at least in theory be non-Darwinian. This leads us ineluctably back to the second great spiritual dilemma. The philosophical question of interest that it generates in the following: Can the cultural evolution of higher ethical values gain a direction and momentum of its own and completely replace genetic evolution? I think not. The genes hold culture on a leash. The leash is very long, but inevitably values will be constrained in accordance with their effects on the human gene pool. The brain is a product of evolution. Human behavior—like the deepest capacities for emotional response which drive and guide it—is the circuitous technique by which genetic material has been and will be kept intact. Morality has no other demonstrable ultimate function.²

Ethics and religion, according to Wilson, can ultimately be explained by principles of genetic fitness. He envisions a full reductionist program from the humanities to the social sciences and finally to the biological sciences at the base of the reduction. Wilson’s motivating force behind his reductionist program arises from his belief in a continuous genetic evolutionary process that results in cultural evolution. In his studies of insect societies, he observed a genetic basis for the social behavior of ants, bees, wasps, and termites. The degree of complexity of this behavior is truly astonishing, especially when compared with social behavior that is less complex among nonhuman primates. Only mankind rivals the social insects in the complexity of his society. Finding a genetic basis for the society of insects, Wilson by analogy looks for a similar basis for the societies of higher animals like the primates and humans.

Wilson derives his notion of altruism from the behavior of insects who sacrifice their lives for a genetic advantage in fitness for their sister insects in the colony. In Wilson’s sociobiological account, the altruistic act is genuinely altruistic only when it increases the “*inclusive fitness*: the sum of an individual’s own fitness plus the sum of all the effects it causes to the related parts of the fitnesses of all its relatives.”³

Even though admitting the cultural origin of much of human altruism, Wilson also claims the human emotion underlying selfless behavior has a genetic origin.⁴ He further differentiates “hard-core” altruism, “a set of responses relatively unaffected by social reward or punishment beyond childhood” and “likely to have evolved through kin selection,” from “soft-core” altruism, a form of altruism that is “ultimately selfish” and which “expects reciprocation from society. . . .”⁵ Human altruistic behavior represents a combination of hard-core and soft-core altruism with the former leaning towards aggression and warfare and the latter to social cohesiveness and a harmonious civilization. Wilson believes humans possess enough selfishness (soft-core altruism) to prevent the destruction of civilization by hard-core behavior. But he also believes we can never escape our evolutionary roots of genetic altruism (hard-core) that lead us to seek a better and more inclusive fitness for our close kin.

Donald T. Campbell has countered the strong reductionist thesis of sociobiology, that all human behavior can be explained as grounded in a genetic base, with the following alternative thesis: “1. Human urban social complexity has been made possible by social evolution rather than biological evolution. 2. This social evolution has had to counter individual selfish tendencies which biological evolution has continued to select as a result of the genetic competition among the cooperators.”⁶ On the basis of this two-fold thesis Campbell argues that social scientists rejecting the moral inhibitions imposed by traditional society have been wrong because only these social mechanisms can prevent humans from destroying themselves in individual or even in group competition. Campbell, no less than Wilson, is a reductionist at heart; his reduction of human behavior, however, does not proceed from human social actions to biological evolution as in sociobiology, but rather from human social actions to an interaction model of biological and social evolution. Campbell believes the mechanisms by which these two evolutionary processes occur are different. Although possessing the similarities of variation, selection, and retention, the ways in which biological evolution produces these three features are very different from the ways in which social evolution produces them.

Wilson has been accused of taking the categories of human behavior and projecting them onto his understanding of the social insects, then discovering these same categories among the insects and bringing them back as applicable to human beings, thus completing a circular loop of reasoning.⁷ Critics argue that Wilson and other sociobiologists have illegitimately mirrored human behavior in animals and then reflected the same behavior back to humans—and that the culprit in this mirroring process has been metaphorical usage.

Sociologists, however, cannot be faulted for using metaphors because most discoveries rest upon hypothetical analogies or metaphors.⁸ Science is no exception in this legitimate employment of metaphors; the scientist takes a fundamental insight about the world and projects it metaphorically into the unknown, speculating upon how things might be. He then tests his metaphoric projection by experiment. Nevertheless, metaphors can be dangerous if they are constructed as hypothetical concepts, find little corroboration, but still through continued familiarity take on the character of being actual rather than tentative.

Wilson, at the conclusion of his article on "Slavery in Ants," clearly recognizes the danger of pushing metaphoric speculations too far.

Does ant slavery hold any lesson for our own species? Probably not. Human slavery is an unstable social institution that runs strongly counter to the moral systems of the great majority of human societies. Ant slavery is a genetic adaptation found in particular species that cannot be judged to be more or less successful than their non-slave-making counterparts. The slave-making ants offer a clear and interesting case of behavioral evolution, but the analogies with human behavior are much too remote to allow us to find in them any moral or political lesson.⁹

He further demonstrates an amazing self-awareness of the possibility of semantical ambiguity in sociobiology.

Much of what passes for theory in studies of animal behavior and sociobiology is semantic maneuvering to obtain a maximum congruence of classifications. This process is useful but better described as concept formation. Real theory is postulational-deductive. To formulate it, we first identify the parameter, then we define the relations between them as precisely as we can, and finally we construct models in order to relentlessly extend and to test the postulates.¹⁰

In spite of this awareness, Wilson does seem to have constructed hypothetical metaphors like "The Morality of the Gene," the title of the first chapter of his *Sociobiology*, and then without sufficient corroborating evidence converted the metaphor into something he claims is actual (a process of hypostatizing). At the conclusion of chapter 5, "Group Selection and Altruism," of *Sociobiology* Wilson observes:

In the opening chapter of this book, I suggested that a science of sociobiology, if coupled with neurophysiology, might transform the insights of ancient religions into a precise account of the evolutionary origin of ethics and hence explain the reasons why we make certain moral choices instead of others at particular times. Whether such understanding will then produce the Rule [an ethical rule] remains to be seen. For the moment, perhaps it is enough to establish that a single strong thread does indeed run from the conduct of termite colonies and turkey brotherhoods to the social behavior of man.¹¹

Even this thread, however, seems to be difficult to find when Wilson differentiates between hard-core and soft-core altruism among hu-

mans and claims that the latter derives from the former. Wilson even overextends his metaphors in attributing human traits to the social insects. Although he observes that slavery among ants remains different from slavery among humans, he claims that altruistic suicide is comparable in the two groups.¹²

The employment of the metaphor "humans are animals" by sociobiologists only partially describes human behavior, for, if we follow Campbell's thesis above, the reductionist explanation of ethics cannot be supported by a continuous biological description of genetic evolution without the invocation of an independent cultural evolution. Let us turn now to the other basic metaphor, "humans are machines." We assume that machines have been fabricated by humans; they are artificial devices usually constructed to fulfill a human purpose as contrasted with natural events such as earthquakes and volcanoes.

On the frontiers of contemporary research, exploration regarding the relationship between the mind and brain depends upon basic metaphors as foundations upon which to construct theories. Among the various metaphors presumed to underlie the interconnection between brain and mind, the computational metaphor occupies center stage. Under this metaphor, the brain can be viewed as a device functionally similar to a computer and the mind emerges as a series of programs by means of which the brain functions. Human thinking does not necessarily reduce to brain functions; rather, human thinking and brain functions combine to produce a computational process. The "hardware" of the brain operates under the control of the "software" of the mind to produce computation which we have traditionally called cognition. The core of the computational metaphor is described by Zenon Pylyshyn:

The view that cognition can be understood as computation is ubiquitous in modern cognitive theorizing, even among those who do not use computer programs to express models of cognitive processes. One of the basic assumptions behind this approach sometimes referred to as "information processing," is that cognitive processes can be understood in terms of formal operations carried out on symbol structures. It thus represents a formalist approach to theoretical explanation. In practice, tokens of symbol structures may be depicted as expressions written in some lexicographic notation (as usual in linguistics or mathematics), or they may be physically instantiated in a computer as a data structure or an executable program.¹³

The computational metaphor for cognition represents tangible evidence of the success of an interactionist view of metaphor. In an interaction metaphor, both parts of the metaphor are altered. The advent of the modern computer brought with it the metaphorical suggestion that these machines think; the discipline of artificial intel-

ligence was developed by those computer scientists, philosophers, and psychologists who accepted the metaphorical suggestion that computers engage in mental activities similar to those of humans. When we claim metaphorically that “computers think,” not only do machines take on the attributes of human beings who think—we ask whether computers have intentions and feelings as well as the ability to make rational deductions—but “thinkers” (human beings) take on the attributes of computers. And that is exactly what has happened in the case of the computational metaphor: we now describe the mind of a human being in terms of the attributes of a computer. We talk about the neuronal states of the brain as if they were like the internal states of a computer; we also talk of the mental processes as if they were like the internal states of a computer; we even talk of the mental processes of thinking as if they were algorithmic. Computers are like minds in many respects: they can store data, recall it, manipulate it, learn to recognize new patterns, and even create new cognitive patterns. Human cognition is like machine computation: humans can manipulate strings of symbols according to rules in language and mathematics. Although computers are faster and more efficient than humans in many computations, most of the differences between the two remain on the side of humans who have emotions, possess more creativity, and are intentional in many of their actions. Those who deny intelligence to computers emphasize the uniqueness of these human functions while those who affirm artificial intelligence in computers downplay the differences by dismissing the significance of human emotions for computers and by claiming that computers have intentionality.

John McCarthy, reputedly the originator of the appellation “artificial intelligence,” argues that the ascription of mental qualities to machines is perfectly legitimate and should not be prohibited.¹⁴

To ascribe certain “beliefs,” “knowledge,” “freewill,” “intentions,” “consciousness,” “abilities” or “wants” to a machine or computer program is legitimate when such an ascription expresses the same information about the machine that it expresses about a person. It is useful when the ascription helps us understand the structure of the machine, its past or future behavior, or how to repair or improve it. It is perhaps never logically required even for humans, but expressing reasonably briefly what is actually known about the state of a machine in a particular situation may require mental qualities or qualities isomorphic to them. Theories of belief, knowledge and wanting can be constructed for machines in a simpler setting than for humans and later applied to humans. Ascription of mental qualities is most straightforward for machines of known structure such as thermostats and computer operating systems, but is most useful when applied to entities whose structure is very incompletely known.¹⁵

McCarthy's argument hinges on the word "same"; when does an ascription express the *same* information about a person as a machine? To a thermostat McCarthy ascribes the simple belief statements of: "The room is too cold," "The room is too hot," and "The room is OK." Yet this does not entail that the thermostat understands the concept of "too cold" which humans certainly do understand. If "belief" means only specific actions or dispositions to act, then the thermostat certainly does possess the three beliefs ascribed to it by McCarthy. If belief includes understanding and assent to a proposition, then it remains doubtful that the thermostat possesses beliefs in the *same* way humans do.

The metaphorical ascription of human traits to computers or attributes of computers to humans raises the question of just what parts of the metaphor are the same for both. The computational metaphor identifies the brain with the computer and the mind with a program. Both these identifications are far from perfect analogies; the brain exists in a body, a product of biological evolution, and the mind (if not identical with the brain) exists in part in a cultural context, influenced by parents, teachers, books, research programs, and so on. The computational metaphor, a contemporary, particular form of the metaphor "humans are machines," cannot stand alone as an adequate description of the nature of man for it leaves out too many of man's biological aspects.

Julien Offray de La Mettrie, famous and perhaps wrongly considered infamous, for his early use of the mechanical metaphor in his *Man a Machine* (1748) recognized the inadequacy of describing human beings *only* in mechanical terms. Many who have not read this work imagine that La Mettrie compared a human person to a mechanical device like a watch and, indeed, he did as one can see in the following quotation; but he also recognized that "man is so complicated a machine that it is impossible to get a clear idea of the machine beforehand, and hence impossible to define it" and so he resorted to a variety of metaphors.¹⁶ One of these is largely mechanical.

The human body is a watch, a large watch constructed with such skill and ingenuity, that if the wheel which marks the seconds happens to stop, the minute wheel turns and keeps on going its round, and in the same way the quarter-hour wheel and all the others go on running when the first wheels have stopped because rusty or, for any reason, out of order. Is it not for a similar reason that the stoppage of a few blood vessels is not enough to destroy or suspend the strength of movement which is in the heart as in the mainspring of the machine; since, on the contrary, the fluids whose volume is diminished, having a shorter road to travel, cover the ground more quickly, borne on as by a fresh current which the energy of the heart increases in proportion to the resistance it encounters at the ends of the blood vessels?¹⁷

La Mettrie also likens the recall of ideas to a gardener who in knowing plants “recalls all stages of growth at the sight of them.”¹⁸ The images produced in the brain, he compares to a “magic lantern.”¹⁹ Even the “soul” is described as an “enlightened machine.”²⁰ But in comparing the human body to a machine, La Mettrie becomes fascinated with the biological part of the metaphor and speaks of the brain as having muscles for thinking and declares that to know ourselves better we must not only look to machines but to animals as well.

Thus, the diverse states of the soul are always correlative with those of the body. But the better to show this dependence, in its completeness and its causes, let us here make use of comparative anatomy; let us lay bare the organs of man and of animals. How can human nature be known, if we may not derive any light from an exact comparison of the structure of man and of animals?²¹

This is the message hidden to those who know of La Mettrie's metaphor of man as a machine only by reputation. La Mettrie's “machine” is a blood and guts machine that must be illuminated not only by the mechanical parts of artifices but also by comparison with animals.

As a product of evolution, the biological aspects of human beings must be described by any metaphor or series of metaphors that attempts to explain human nature. Pylyshyn employs only the computational metaphor of “cognition is computational” and assigns the animal nature of man to an instantiation of what he calls the “functional architecture” of the mind. Pylyshyn speaks of computation and mind on two levels: (1) the theoretical requirements for computation and mind, and (2) the biological structures and processes of the brain that carry out computations. These correspond to the software and hardware of a computer. But even with this distinction, Pylyshyn has difficulty accounting for the intentionality and consciousness that humans exhibit in forming self-conscious goals that alter their mentality.

The metaphors “humans are animals” and “humans are machines” only partially describe human nature. The reductionist case of socio-biology has not been fulfilled nor have our cognitive processes been fully represented by the computational metaphor, a particular form of the machine metaphor. One might be tempted to conclude as Arbib did that, if each of these metaphors alone remains inadequate, if we adopt both of them simultaneously in a complementary fashion, we can capture most of the essence of humanity. The metaphor of humans as animals recognizes our evolutionary biological development while the metaphor of humans as machines recognizes our evolutionary social development. If, as Campbell suggests, these two forms of evolution are different, then we will need to develop an

interactionist model of evolution that includes both forms, the Darwinian form of biological evolution and the Lamarckian form of cultural evolution. As we develop this model we shall propose that one of the prominent devices for interaction or mediation between biological and cultural evolution will be metaphors as such (a process described more fully in the section after next). Ethics and religion will be explained by reduction to this dual model of evolution, so that our human purpose will be to transmit both genetic material and cultural information to future generations. But how should we do this? Our awareness of these evolutionary processes allows us partially to influence their development. Should we then merely decide to increase the efficiency of transmission or should we decide to develop certain cultural features sometimes at the expense of genetic fitness? Technological development may assist in our survival and procreation but high technology in weaponry may also pose the possibility of our own extinction. If artistic achievement becomes highly valued, then the development of the arts in culture may be only remotely related to the biological transmission of genes. By opening the question of what goals to pursue in our culture, of what cultural information we want to develop and transmit, other than just the goal of the transmission of genetic material to future generations, we raise the question of purpose in life and the animal and computational metaphors will do little to provide an answer. Further, if we ask about the ultimate purpose of man, we are raising a religious question. Religious metaphors provide instruments for completing the description of the nature of man. Like other metaphors, religious metaphors arise out of and participate in the interaction between biological and cultural evolution, that is, they mediate between these two forms of evolution; but they also describe us as transcending this continuum of humans as animals and humans as machines. They perform this function by projecting the possibility of an ultimate meaning in life beyond that of existence confined by biology and culture. Before proceeding to an account of how religious metaphors achieve this result, we shall first develop a few general notions of the nature of metaphor necessary for our explanation.

A SKETCH OF A GENERAL THEORY OF METAPHOR

Metaphors juxtapose two or more referents not normally associated, thereby producing a new understanding or new meaning in the reader or hearer.²² Sometimes the metaphor takes two familiar terms not usually placed together and links them; sometimes the metaphor expresses the unfamiliar in terms of the familiar; sometimes the

metaphor coins a new word to express a new conception; or sometimes the metaphor uses a seemingly contradictory juxtaposition of referents to achieve its meaning. For us to understand a metaphor we must find some analogy among the referents; however, for the metaphor to be a metaphor there also must be some dissimilarity among the referents suggesting a new meaning. If there existed no disanalogy between the referents, we would have a simple analogy and not a metaphor in the expression. Some metaphors produce in us the reaction of almost instant recognition of the analogy like "time flies"; when confronting these new metaphors we gain an insight we had not seen previously. As the insight becomes commonplace, the metaphor fades and dies, becoming a part of ordinary language. Other metaphors perplex us by their juxtaposition of referents, so much so that we consider the hypothesis suggested as a hypothetical possibility like the "charmed quark." Philip Wheelwright called this first kind of metaphor an "epiphor," a metaphor that is more expressive than suggestive. He called the second kind of metaphor a "diaphor," a metaphor that is more suggestive than expressive.²³ All legitimate metaphors, however, are both expressive and suggestive so that there are no pure epiphors or pure diaphors; a pure epiphor would become a mere analogy while a pure diaphor would be unintelligible.

Confronting a new vibrant metaphor produces emotional tension in the hearer. Some theorists of metaphor have seized upon this emotional surprise as the characteristic mark of a metaphor. They measure the metaphoric quality of an expression by how much tension it produces in us. As the tension diminishes, so the expression ceases to be a metaphor and becomes part of ordinary language. However, if we become familiar with a diaphor as in a scientific hypothesis, then its tension may decline but it still remains a tentative suggestion rather than an expression of the ordinary. The emotional tension produced in the hearer is more of a symptom of metaphor than a characteristic. Anomaly among the semantic features of the referents produces the emotional tension. This semantic anomaly diminishes not just through familiarity with the metaphor but rather as we find evidence to confirm the hypothetical juxtaposition of referents. Corroborating evidence either through experience or through experiment diminishes semantic anomaly by leading to a change in the meanings of the referents. As the semantic anomaly declines, so the tension disappears. Yet, tension alone as a measure of metaphor may be misleading since it may vanish either through familiarity alone or through familiarity supported by evidence.

Consider the metaphor "genes are sentences," a reasonably common and fruitful metaphor in contemporary biology. "The genetic

information is encoded in the sequence of the nitrogen bases in the nucleic acids. The nitrogen bases may be considered the letters of a genetic alphabet. A specific sequence of letters in the English alphabet can make up any word of the English language; a sequence of words conveys information. In an analogous fashion, one may think of genes as genetic 'sentences.' The genetic endowment of the individual may then be thought of as a 'book' made up of genetic sentences."²⁴ Sentences convey information and genes convey information; the analogy seems striking and yet both the kind of information and the manner in which that information flows seem different. Much of the semantic anomaly occurs because genes are a subset of animate entities while sentences are a subset of inanimate entities. If one engages in a componential semantic analysis, then one of the semantic markers for "gene" will be "animate" and one of the semantic markers for "sentence" will be "inanimate." How can one juxtapose referents that are animate and inanimate? One might be tempted to suggest that humans, animate beings, produce sentences and produce genetic material, but the ways in which sentences and genetic material are produced seem so vastly different as to defy direct linkage. Even though animate beings originate sentences, the sentences themselves are not animate (as genetic material is) but inanimate. As the suggestive metaphor "genes are sentences" finds indirect corroboration through the experimental testing of theories, the word "sentence" takes on the partial semantic marker of animate while the word "gene" may take on some of the meanings of inanimate information. This change of semantic markers will be to a degree, similar to the membership of entities in mathematical fuzzy sets. "Gene" will still be associated largely with the marker animate while "sentence" will remain largely inanimate, but each to a small degree will take on the property of the other attribute.²⁵ This characteristic of possessing properties to a degree in the referents of metaphors also brings with it the consequence that metaphors are usually neither absolutely true nor false; rather, they are true to a certain degree and false to a certain degree. Metaphors, therefore, do not produce outright contradictions; the formulator of a metaphor does not intentionally create a contradiction to suggest a new meaning as proponents of the controversion theory maintain. The formulator of a new metaphor properly juxtaposes referents in an unusual way to suggest a new possibility. He intentionally produces a semantic anomaly as an hypothesis for confirmation or disconfirmation.

Metaphor exists as a linguistic device in surface language, but the ability intentionally to produce a semantic anomaly in order to suggest a new meaning finds its origin in a cognitive process. Metaphors bear witness to the ability of the human mind to consider and represent

new hypotheses. Embedded in the brain is the capacity to generate new meanings through semantic change. This is an inherited capacity but operates through a phenotypic interaction with the environment. Our stock of semantic meanings, however, resides in culture and must be learned through language acquisition. So in the cognitive process of metaphor formation, a brain process occurs which draws from the culturally learned stock of semantic entities stored in memory several referents not normally associated and puts them together to suggest a new possible meaning. This cognitive process depends upon a capacity of the brain that has evolved biologically and also upon a social evolutionary process, for the words that one has stored in memory depend upon parental upbringing and exposure to language in society not only in everyday conversations but also in formal schooling. The limits of one's vocabulary partially determine the limits of one's ability to form and understand metaphors. Some people are gifted in their ability to form new metaphors; few of us can match Wallace Stevens and Dylan Thomas in their creative ability to form metaphors. Some combination of brain process and cultural influence gives them this ability.

Metaphors can be used to express and suggest various particular insights by poets, scientists, and even philosophers. We shall call this common form of metaphorical expression the use of a "conveyance" metaphor. But metaphors also can be used in a more comprehensive manner as "basic" metaphors that underlie a global theory. We saw this usage in the metaphors "humans are animals" and "humans are machines." As descriptions of human nature neither of these was to be taken literally; each basic metaphor suggested a possible way of conceiving of the nature of man. Stephen Pepper called this usage the employment of "root metaphors" in his *World Hypotheses*.²⁶ We have changed the name from "root metaphor" to "basic metaphor" in order to eliminate Pepper's association of root metaphors with metaphysical systems. For us, a basic metaphor undergirds a theory as the foundation upon which it is constructed. Many scientific theories rest upon the presumption that "the world is mathematical," a basic metaphor not literally true but suggestive of how to construct theories and how to measure results in experiments. Religion also depends upon basic metaphors as the foundation for their theological statements. Christians, for example, often presume that "God acts in history" is a basic metaphor.

Recognition of a basic metaphor's function eliminates much of the confusion over the distinction between literal and metaphorical language, especially with respect to religious language. Some commentators on metaphor have claimed that all language is metaphorical, meaning that one cannot invoke a theory about language without

presuming a basic metaphor. We agree, even though it poses the problem that to construct an explanatory theory without presuming a basic metaphor becomes impossible. One can claim, however, that a theory of language (including a theory of metaphor and including religious language) must be founded upon a basic metaphor without also claiming that every statement must be metaphorical. Some statements will be literal, nonabsolute ordinary descriptions of objects and events in the world. Recognition of these literal objects and events requires cognitive activity, the use of concepts. Nevertheless, the cognitive activity in recognizing ordinary entities is very different from the cognitive activity involved in metaphoric comprehension where the puzzle of semantic anomaly must be solved; the hearer of a metaphor must decide (often implicitly) which attributes of the referents are similar and which are dissimilar before he can understand the novel meaning.

With this brief sketch of metaphor in mind, we now proceed to an examination of how metaphors mediate between cultural evolution and biological evolution and then finally move to a consideration of the special significance of religious metaphors.

METAPHORS AS MEDIATORS BETWEEN BIOLOGY AND CULTURE

All forms of language mediate between (or interrelate) biological evolution and cultural evolution in the sense that language has been an instrument for human survival; those brains that have survived depended in part upon language to adapt to the environment. Language has shaped the development of culture; many societal artifacts and institutions, such as story telling, papyrus scrolls, books, libraries, newspapers, data banks, and television, exist in part to store, manipulate, and transmit language. Our very language ability depends upon the capacity of our brain to recognize and generate language, and the symbols used in this transmission have been shaped by culture. The utterance of ordinary, literal language does little to change the interaction between the brain and culture for in ordinary discourse we merely recreate well-worn neuronal paths in the brain and produce well-accepted cultural forms. In the creation of new metaphors, however, new associations somehow are formed in a neuronal process, generating expressions that disturb the status quo of ordinary language. Metaphors force hearers to engage in imaginative thinking and they also bring about semantic changes in language well established in culture.

How the brain produces imaginative new associations of referents remains extremely murky. At best, the two accounts we will cite are highly speculative and not completely clear in their distinctions.

Eugene G. d'Aquili and Charles D. Laughlin speculate upon the location of a myth-making area of the brain. Since myths usually use metaphors in extended stories, metaphor must be partially involved in this area of the brain also.

The capacity to mythologize involves at least three critical higher cortical functions: conceptualization, abstract causal thinking, and antinomous thinking. First, all myths are couched in terms of named categories of objects that we call concepts or ideas. Second, all myths, like all other rational thoughts, involve causal sequences. Third, myths involve the orientation of the universe into multiple dyads of polar opposites.

At the risk of appearing overly simplistic, we note that all three of these higher cortical functions involve, in one way or another, a specific area of the brain. This area of man is composed of the supramarginal and angular gyri, as well as of certain adjacent areas. It can best be visualized as the area of overlap between the somesthetic, visual and auditory association areas. It is, so to speak, an association area of association areas. It allows for direct transfer across sensory modalities without involvement of the limbic or affective system. It is as if three complete systems, one for each of the three major sensory modalities mentioned, were hooked into each other and the information from each became available to all. Such a system allows classes of objects to be set up that are vastly more inclusive than any classifying system within each individual sensory modality.²⁷

Myths contain many nonmetaphorical statements, so that even if d'Aquili and Laughlin were correct in their identification, we would have found only that area of the brain where some basic metaphors function.

Recently, Brenda Beck presented a very different account of metaphors as cognitive devices that mediate between the analogies produced by sensory association and verbal categories.²⁸ She identifies a preverbal form of reasoning in which sensory inputs mix with emotions and motor functions in a manner that remains unclear but does generate analogies not usually perceived or comprehended. Her paradigm for this activity is synaesthesia. This preverbal reasoning produces metaphors that mediate between the analogies derived from sensory associations and semantic categories. Her notion of semantics extends beyond mere words since some metaphors result in metaphoric gestures and rituals: About verbal metaphors, however, she says:

A verbal metaphor can now be understood as a device whose function is to inject the results of analogic reasoning processes into the semantic domain. As [J. W.] Fernandez has said, a metaphor bridges gaps. We can now understand this as a process whereby images and experiential associations that develop at a level where a network of sensory associations prevails are transferred to a level where thoughts are ordered according to a logic or verbal categories. Metaphors cross over such categorical divides as animate/inanimate, cosmic/biological, human/animal by recourse to associative and sensory logic.²⁹

What Beck calls a preverbal sensory process, we prefer to describe as the brain's activity in producing novel juxtapositions of referents that may not all be sensory, for such a process could easily put together a sensory referent with an abstract one.

Neither account tells us precisely where in the brain metaphor formation takes place, nor do they tell us how except that both agree some special process of association takes place. In addition, a critic may argue that how such a process takes place is irrelevant to the significance of metaphor and that in citing accounts of novel associations in the brain, we are confusing the discovery of the origin of a process with an explanatory account that justifies it. Our reply is twofold: first, given the widely acknowledged theory-ladenness of observations, a separation of discovery from justificatory accounts cannot itself be justified; second, it is important to look at such accounts to test whether one could reduce metaphoric activity to biological activity in the brain, thereby confirming the metaphor "humans are animals" as literal. Our objection to this reduction does not rest just upon the unfinished status of probes into the brain. More importantly it rests upon the fundamental role that language as a part of culture plays in the formation of metaphors, even though in a trivial sense there would be no concepts of language without a brain. We come back to our original discussion of animal and machine metaphors of human nature and to Campbell's thesis that biological and cultural evolution are distinct although interrelated sets of processes. The operations of the brain mirror the culture in which we live. The language we speak is learned in a cultural context; communication itself depends upon shared assumptions about the meaning of language and the nature of the world. Thus, the generation of a new metaphor like "The telephone is my umbilical cord to the world" results not just from the firing of my neurons; it also reflects the cultural language I have learned and the institutions like the telephone and events like birth that I share with others. Not that every metaphor like "The telephone is my umbilical cord to the world" directly changes the brain or culture. Gradually over time, semantic change affects the way in which we comprehend the world and the decisions we make in society in terms of our language may affect the ways in which the brain continues to evolve.

Metaphors may serve as interactive instruments to mediate between biological evolution and cultural evolution; they may mediate between the two descriptions of humans as animals and as machines but they leave us on that continuum from animal to machine. Religious metaphors may not only mediate, but they also may transcend the continuum altogether and to this last claim in this paper we now turn.

RELIGIOUS METAPHORS

Like many other metaphors, religious metaphors are formed by the brain out of semantic expressions learned from culture, and they thereby may interrelate biological and cultural evolution. A neuronal process juxtaposes referents not normally associated as in the case of other metaphors often eventually leading to semantic change in the language through usage. But religious metaphors differ by suggesting possible meanings not on the continuum of the metaphors of "humans are animals" and "humans are machines." Religious metaphors suggest a dimension of human existence beyond the physicality of animals and machines. They present the possibility of an ultimate meaning in life beyond that of a human being serving as a tiny link in hundreds of millennia of biological reproduction and a few millennia of cultural transmission of information.

Traditional theists attempt to talk about a transcendent God beyond the everyday world of experience. To do so they take ordinary words and stretch their meaning by formulating metaphors. God is spoken of as a king or as a person who intervenes in earthly affairs. In Psalm 5, the author calls upon a kindly God with supplication in prayer and worship to punish the wicked and protect the righteous.

Give ear to my words, O LORD:
 give heed to my groaning.
 Harken to the sound of my cry,
 my King and my God,
 for to thee do I pray.
 O LORD, in the morning thou dost
 hear my voice;
 In the morning I prepare a
 sacrifice for thee, and
 watch.
 For thou art not a God who delights in
 wickedness;
 evil may not sojourn with thee.
 The boastful may not stand before
 thy eyes;
 thou hatest all evildoers.
 Thou destroyest those who speak
 lies;
 the LORD abhors bloodthirsty and
 deceitful men.³⁰

The divine King does not roam the world like an early king with armies and retinue; nor can one see the divine King's actions directly. Sometimes God seems to intervene in historical acts and at other times he seems absent. The basic metaphor underlying this type of theological interpretation of the world seems to be, "The world is a collection

of the actions of a divine King intervening in history.” This type of basic metaphor, and many other similar ones presumed by believers in different religious traditions, leads many to make the judgment that all religious language is metaphorical. By this claim they mean that all religious language presupposes a basic metaphor from which all utterances by believers issue forth. They do not mean that every religious utterance expresses a specific metaphor. Christine Brooke-Rose notes this religious use of metaphor as follows:

In a similar way, actions attributed to God, spirits or demons or gods, are unmetaphoric in the sense that divine persons are omnipotent and so capable of any action. But they are metaphoric in the sense that almost everything we say about divine persons is an anthropomorphic transference. In theological terms, there are very few things we can say about God which are not metaphoric (God is, God is good, and a few others). We know nothing of heaven, whether it shines or sings, except what we have been told in parable or what we have invented. Thus everything we say of gods, God, Christ, the Holy Spirit, Our Lady, angels or devils as conceived in a heaven or a hell or invisibly on earth is metaphoric. Even Lucifer’s fall, presented in physical terms, is metaphoric, at least originally. Yet these actions are perfectly possible to them. But the actions of Christ or Our Lady on earth can be either literal or metaphoric: for example, “the Holy Spirit entered Mary” or “Christ walked on the water” are miraculous but literal. “Christ *lodged* in Mary” or “Christ came to *fight*” are metaphoric.³¹

Within the assumption of the basic metaphor—that God intervenes in the world—one can make literal statements as Brooke-Rose indicates. But these literal statements like “Christ walked on the water” assume the absolute truth of the basic metaphor, an assumption that often creates a myth. Taking a basic metaphor and converting it into an absolute statement without full confirmation generates a myth.³² The believer’s lingering doubt that God may not have intervened in the world at one or another point in space and time protects the hypothetical aspect of the basic metaphor and protects religion from literalism. But the believer may well have individual experiences or direct confrontations with God that convince him of the literalness of a statement like “God is” while still retaining the basic metaphor that “God intervenes as a king in human history” as a tentative hypothesis only partially confirmed.

Acceptance of a basic religious metaphor as a tentative, partially confirmed hypothesis about God, humans, and the world gives the believer an ultimate meaning in life that transcends physical existence expressed by the animal and machine metaphors. To these two metaphors we can add the religious metaphor: “humans partake of the divine.” This religious metaphor will never be fully reducible to a literal statement and demands from critics for such a reduction misconstrue the function of such metaphors. Campbell notes this irreducible metaphoric quality of religious expression as follows:

Sophisticated behavioral scientists are apt to acknowledge this [the nonliteral quality of language] for their own field but they relapse into an epistemic arrogance and literalism when dealing with religious claims for truth. Because such behavioral scientists no longer believe in what they assume to be the literal referents of religious words, they lose sight of the possibility that these words refer to truths for which there is no literal language, which must be metaphorically or figuratively expressed if to be communicated at all. They hold up for religious discourse the requirements for a direct realism, a literal veridicality, even though they may recognize that this is impossible for science itself.³³

This assertion of the metaphoricality of religious language does not mean that believers have no direct, literal warrants for their assertions. Usually, believers claim to have some direct, religious experience which confirms their assertions of "God is" as a literal statement. Recall that we have not claimed that literal statements are absolute, only that they are expressed in ordinary language and are accessible. Believers often claim that feelings of awe or of the presence of a divine ultimate being form the experiential basis of "God is." Nor are literal statements unmediated by concepts. Even our expression "that is a chair" spoken while pointing to a chair (ostension) requires the use of a concept presumed cognitively (chair).

All religious language is metaphorical in the sense of presuming a basic metaphor like "God acts in history." Some religious expressions are metaphorical in the sense of that presumption and also as conveyance metaphors—"the Kingdom of God is like a mustard seed." Like all other basic metaphors, basic religious metaphors mediate between the brain processes that produce the metaphors and the culture from which the language of these metaphors has been drawn. At this point a sociobiologist might want to retort that the reason why religious metaphors have persisted through the ages is that the invocation of these metaphors generating meaning has given man an advantage in genetic fitness. Belief in the divine has helped humanity to survive and reproduce. The argument of the sociobiologist remains a distinct possibility; we do not possess a direct refutation. If one considers the strategy of the sociobiologist in making this conjecture, however, the attempt to reduce religion to genetics may lose some of its force. Whatever the phenomenon that seems to find an origin outside of genetic advantage, the sociobiologist seeks to find a reduction. We briefly sketched Wilson's effort to accommodate different forms of altruism among humans to a redefined concept of altruism that includes both the behavior of insects and humans. The sociobiological treatment of religion seems to make the same move: the content of the basic religious metaphor is not taken seriously, the ultimate reality suggested by the basic metaphor "God intervenes in history" is set aside and the function of this metaphor is considered

solely in terms of its mediation between the brain and culture. The meaning of the religious metaphor is denied in favor of its mediating function. Yet, this meaning is just what makes religious metaphors distinctive and different from the metaphors "humans are animals" and "humans are machines." The basic religious metaphor proposes that we exist not only as partially an animal and partially as a machine (in culture) but also partially in a divine realm of ultimate meaning. If the sociobiologist persists in reducing every conceivable phenomenon to some form of genetic advantage, he may place himself in the position of having formulated an unfalsifiable position by not allowing any other position as possibly providing limiting or falsifying evidence to his own. A basic religious metaphor does not eliminate other basic metaphors; rather it adds a different possibility of human existence to our physicality and cultural activities.

NOTES

1. Michael Arbib, *The Metaphorical Brain* (New York: John Wiley, 1972), p. vii.
2. Edward O. Wilson, *On Human Nature* (Cambridge, Mass.: Harvard University Press, 1978), p. 167.
3. Edward O. Wilson, *Sociobiology* (Cambridge, Mass.: Harvard University Press, 1975), p. 118.
4. Wilson, *On Human Nature*, pp. 153-54.
5. *Ibid.*
6. Donald T. Campbell, "On the Conflicts between Biological and Social Evolution and between Psychology and Moral Tradition," *American Psychologist* 30 (1975): 1103-26, reprinted in *Zygon* 11 (September 1976): 189.
7. Sociobiology Study Group of Science for the People, "Sociobiology—Another Biological Determinism," *BioScience* 26 (March 1976), reprinted in *The Sociobiology Debate*, ed. Arthur L. Caplan (New York: Harper & Row, 1978), p. 284.
8. Earl R. MacCormac, *Metaphor and Myth in Science and Religion* (Durham, N.C.: Duke University Press, 1976).
9. Edward O. Wilson, "Slavery in Ants," *Scientific American* 232 (June 1975): 36.
10. Wilson, *Sociobiology*, p. 27.
11. *Ibid.*, p. 129.
12. Wilson, *On Human Nature*, p. 151.
13. Zenon W. Pylyshyn, "Computation and Cognition: Issues in the Foundation of Cognitive Science," *Behavioral and Brain Sciences* 3 (March 1980): 111.
14. Pamela McCorduck, *Machines Who Think* (San Francisco, Calif.: W. H. Freeman, 1979), p. 96.
15. John McCarthy, "Ascribing Mental Qualities to Machine," in *Philosophical Perspectives in Artificial Intelligence*, ed. Martin Ringle (New York: Humanities Press, 1979), p. 61.
16. Julien Offray de La Mettrie, *Man a Machine* (La Salle, Ill.: Open Court, 1912), p. 89.
17. *Ibid.*, p. 141.
18. *Ibid.*, p. 107.
19. *Ibid.*
20. *Ibid.*, p. 128.
21. *Ibid.*, pp. 97-98.
22. I have developed a more complete theory of metaphor elsewhere. See n. 8 above. Also see "Metaphor Revisited," *Journal of Aesthetics and Art Criticism* 30 (Winter 1971): 239-50; "Metaphor and Literature," *Journal of Aesthetic Education* 6 (July 1972): 57-70; "Scientific and Religious Metaphors," *Religious Studies* 11 (1975): 401-9; "Meta-

phors and Fuzzy Sets," *Fuzzy Sets and Systems* 7 (1982): 243-56; and *The Nature and Meaning of Metaphor*, in preparation.

23. Philip Wheelwright, *Metaphor and Reality* (Bloomington: Indiana University Press, 1962), pp. 72-91. See also Frank W. Bliss and Earl R. MacCormac, "Two Poles of Metaphor: Frye and Beardsley," *Journal of Aesthetic Education* 11 (1977): 33-49.

24. Theodosius Dobzhansky, et al., *Evolution* (San Francisco, Calif.: Freeman, 1977), pp. 21-23.

25. I have developed the applicability of fuzzy sets to metaphors much more carefully and extensively in my "Metaphors and Fuzzy Sets."

26. Stephen Pepper, *World Hypotheses* (Berkeley: University of California Press, 1942).

27. Eugene G. d'Aquili and Charles D. Laughlin, Jr., "The Neurobiology of Myth and Ritual" in *The Spectrum of Ritual: A Biogenetic Structural Analysis*, ed. by Eugene G. d'Aquili, Charles D. Laughlin, Jr. and John McManus (New York: Columbia University Press, 1979), pp. 162-63.

28. Brenda E. F. Beck, "The Metaphor as a Mediator Between Semantic and Analogic Modes of Thought," *Current Anthropology* 19 (March 1978): 83-97.

29. *Ibid.*, p. 85. The reference to Fernandez is: J. W. Fernandez, "The Mission of Metaphor in Expressive Culture," *Current Anthropology* 15 (1974): 119-46.

30. Psalm 5:1-6, RSV.

31. Christine Brooke-Rose, *A Grammar of Metaphor* (London: Secker & Warburg, 1958), pp. 212-13.

32. MacCormac (n. 8 above), pp. 115-34.

33. Campbell (n. 6 above), p. 197.