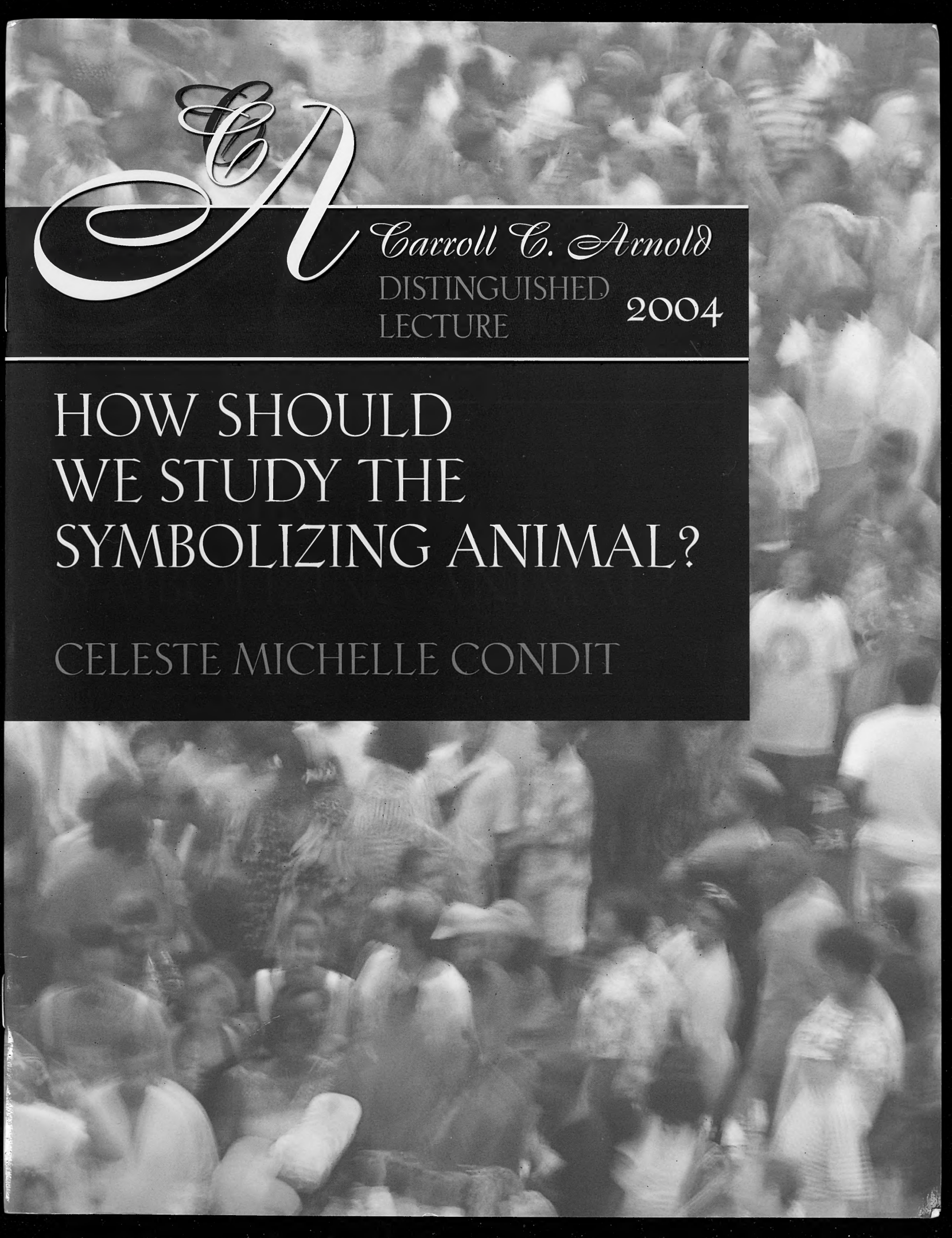

Carroll C. Arnold
DISTINGUISHED LECTURE
2004

HOW SHOULD WE STUDY THE SYMBOLIZING ANIMAL?

CELESTE MICHELLE CONDIT

The Carroll C. Arnold Distinguished Lecture

On October 8, 1994, the Administrative Committee of the National Communication Association established the Carroll C. Arnold Distinguished Lecture. The Arnold lecture is given in plenary session at the annual convention of the Association and features the most accomplished researchers in the field. The topic of the lecture changes annually so as to capture the wide range of research being conducted in the field and to demonstrate the relevance of that work to society at large.

The purpose of the Arnold Lecture is to inspire not by words but by intellectual deeds. Its goal is to make the members of the Association better informed by having one of its best professionals think aloud in their presence. Over the years, the Arnold Lecture will serve as a scholarly stimulus for new ideas and new ways of approaching those ideas. The inaugural Lecture was given on November 17, 1995.

The Arnold Lecturer is chosen each year by the First Vice President. When choosing the Arnold Lecturer, the First Vice President is charged to select a long-standing member of NCA, a scholar of undisputed merit who has already been recognized as such, a person whose recent research is as vital and suggestive as his or her earlier work, and a researcher whose work meets or exceeds the scholarly standards of the academy generally.

The Lecture has been named for Carroll C. Arnold, Professor Emeritus of the Pennsylvania State University. Trained under Professor A. Craig Baird at the University of Iowa, Arnold was the co-author (with John Wilson) of *Public Speaking as a Liberal Art*, author of *Criticism of Oral Rhetoric* (among other works) and co-editor of *The Handbook of Rhetorical and Communication Theory.* Although primarily trained as a humanist, Arnold was nonetheless one of the most active participants in the New Orleans Conference of 1968 which helped put social scientific research in communication on solid footing. Thereafter, Arnold edited *Communication Monographs* because he was fascinated by empirical questions. As one of the three founders of the journal *Philosophy and Rhetoric,* Arnold also helped move the field toward increased dialogue with the humanities in general. For these reasons and more, Arnold was dubbed "The Teacher of the Field" when he retired from Penn State in 1977. Dr. Arnold died in January of 1997.

The founders of the Arnold Lecture specifically called for distributing the lecture widely in printed fashion after the oral presentation has been made and to send it to relevant scholars in allied disciplines as well. This charge became reality via the gracious help of Allyn and Bacon Publishers and by the generosity of friends, colleagues, and students of Dr. Arnold (listed in the back) who honored his scholarly contribution with their personal donations.

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How Should We Study the Symbolizing Animal?

Celeste Michelle Condit
University of Georgia

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Celeste Condit is a Distinguished Research Professor in the Department of Speech Communication at the University of Georgia, Athens, GA. Her current work explores the process of communicating about genetics with the lay public. She has recently focused on issues of racialized groupings in human genetic variation and on gene-environment interactions. She has published five books; the latest is *The Meanings of the Gene* (University of Wisconsin Press, 1999). In addition, she has published over seventy scholarly articles, chapters, and reviews appearing in journals ranging from the *Quarterly Journal of Speech* to the *American Journal of Human Genetics* to *Health Communication*. She has been named a Distinguished Scholar by the National Communication Association.

How Should We Study the Symbolizing Animal?

Celeste Michelle Condit
University of Georgia

It is a great privilege and therefore a great responsibility to be asked to give this lecture, named after the great educator, Carroll Arnold, whom I had the privilege to take a course from when he visited at the University of Iowa during my graduate program. In light of that responsibility, I am using this opportunity to call our collective disciplinary attention to a major intellectual challenge to the traditions of human studies as they have been practiced in the humanities and the social sciences for at least the past hundred years. This challenge has been issued by a group that John Brockman (2003) has dubbed "The New Humanists." I will call this group the bio-humanists.

THE CHALLENGE TO TRADITIONAL HUMAN STUDIES

The bio-humanists follow some version of the project that E. O. Wilson (1998) dubbed "consilience." The program of consilience seeks to unite the study of human beings with the study of all other biological beings. This unification is justified by a belief, widely shared among biologists, that "Comparisons with primates have revealed that it is entirely justified to investigate humans with the same methods used with animals" (Mayr, 2004, p. 37). Although it is described as a unifying model, the model of consilience as offered by E. O. Wilson essentially argues for the replacement of the traditional humanities and social sciences with the biological study of human beings (Ceccarrelli, 2001). Wilson envisions the outcome of this research program as a set of universal laws that explain human behavior as the products of evolutionary fitness. Thus, Wilson describes the post-consilience academy as consisting of only two threads: science (understood as the physical sciences and a physics-based model of biology) and the creative arts (which he enumerates as the practice of literature, visual arts, drama, music, and dance (p. 210)). Specifically, Wilson says, "with science and the arts combined, we have it all" (p. 237).

This campaign to replace the traditional humanities and social sciences with biological accounts sometimes gets quite nasty. Brockman describes the cumulative knowledge of human studies as a "fossil culture" (p. 1), which "continues its exhaustive insular hermeneutics, indulging itself in cultural pessimism, clinging to its fashionably glum outlook on world events" (p. 4). Lest those of you who are social scientists consider applauding this attack on the grounds that you are scientists too, you should notice that the traditional social sciences are dismissed as failures that have produced no powerful, unifying theories that account for human behaviors. Wilson says of political science, for example, that it is not "informed by anything that would be recognizable as authentic theory in the natural sciences," and it lacks "a foundation of verifiable knowledge of human nature sufficient to produce cause-and-effect predictions and sound judgments based on them" (p. 255). Of social scientists more generally, he says "it is obvious to even casual inspection that the efforts of social scientists are snarled by disunity and a failure of vision" (p. 182). Both the humanities and the traditional social sciences are equally to be dismissed from the academic scene in the name of consilience.

RESPONSES TO BIO-HUMANISM

There have been two primary ways in which humanists have responded to this attack. The first is to ignore it, and the second is to respond with some version of the slogan that "it is text all the way down." The wish to ignore the bio-humanist campaign can no longer be indulged because the bio-humanist arguments have become well-developed and widely dispersed. Their alternative vision has not only produced several enormously successful, even best-selling and award-winning books (e.g. Pinker, 1997; Diamond, 1997/1999, Ridley, 1997), but its popularity is threatening the financial foundations of traditional human studies. As a telling example, consider the fact that a recent multi-million dollar NSF call for research projects focused on "human dynamics" nowhere mentioned communication as a possible line of research, nor did it list anything else that one might consider a traditional approach of the humanities or social sciences. In the coming shape of the academy, research dollars are tantamount to survival. Led by a well-funded belief that governments should not support public institutions, universities are becoming required to be self-funding. In this environment, the greater the credibility of the bio-humanist approaches, the greater their funding and the more they will edge out traditional human studies. This process is already underway in psychology departments, where studies of neurobiology are displacing conventional social scientists, because the sub-discipline of neuroscience can bring departments the grant dollars demanded by deans, whereas studies of self-esteem or child development cannot. The change is also reflected in the rapid growth of the biological sciences on campuses across the nation as well.

Even absent such economic pressures, however, intellectuals have a responsibility to respond to serious intellectual challenges. The cumulated arguments of Wilson and Pinker and Diamond have the probative value in the intellectual arena to demand serious engagement. Wilson (1998), for example, has provided evidence-based arguments that recurrent elements of narratives are explicable in terms of basic evolved

propensities in the human brain. He has compiled the evidence that human aesthetic preferences are a product of innate color parsing algorithms. He has also supported the arguments, developed by others, that cross-culturally consistent patterns of sexual division of labor and reward thereof are a product of tendencies evolved in the Paleolithic environment. Similarly, Stephen Pinker (1997) has assembled the evidence that the human brain has evolved modules that respond in predictable ways to various types of frequently encountered situations, for example deploying emotional patterns that are self-serving and effective or utilizing computational biases that reflect the need to place bets in particular ways given evolutionary pressures on humans as a social animal. Matthew Ridley (1997) has likewise synthesized research on cooperation that shows its evolutionary basis and accurately post-predicts some of its contours based on those evolutionary assumptions.

The research base of the bio-humanists has also developed to the point that the now common humanistic response—"it is just text all the way down"—is also untenable. This is a harder claim to defend because there has been enormous effort invested in theoretical defenses of the impossibility of knowledge that grants certainty and of the inevitable ideological tainting of knowledge. The latter approach is manifested in vehement and vitriolic efforts to associate all things genetic or biological with the Nazis. It is as if humanists now believe that discrediting motivations (i.e. *ad hominem* attacks) can remove the obligation to respond to arguments on any other grounds. Unfortunately for traditionalists, that is a bad persuasive strategy because the biologists play the "they're only using bad politics" game more successfully; they are more widely believed to be fact-based than human studies are. In any case, if it were true that everything is solely "text all the way down," then humanists also would have no privileged basis for their claims, and there would be no particular justification for a humanistic academy. A bureau of political purity would suffice.

The claim that only textuality matters is also too self-evidently self-serving. Humanists chant it so fervently because it is so narcissistically pleasing—it puts humanistic work at the center of the academy! Anyone outside the traditional humanities simply has no reason to believe this, and for the most part they don't. Specifically, they realize that even if it is "text all the way down," that doesn't mean that it is *only* text all the way down. The fact that humans must always interpret the world that is other-than-language through language does not mean that there is nothing other than language. Indeed, most of our experiences in life speak to the existence and material force of phenomena that are other-than language (as in, for example, our experiences of pain, food, heat, or tornadoes). The fact that we can't ever be certain that such things exist and influence us does not make them improbable, and so betting against their probability does not constitute a defensible bet. Moreover, uncertainty applies as much to language itself as it does to the outside-of-language. For both persuasive and argumentative reasons, therefore, the self-congratulatory emphasis on the exclusive textuality of being is an argument that is powerless outside the humanities when pitted against the claims of the bio-humanists. Moreover, as I will suggest below, the human studies do not need their claim to be so radically over-stated to do the work that is needed.

A third way of responding to the bio-humanists would be to efface the weaknesses in the humanists' case by attacking the weaknesses in the

opposition. And weaknesses there are. Jarred Diamond (1997/1999) claims that all of the differences in human culture are a product exclusively of differences in geographic variations in distributions of flora and fauna and of the shape of continents. While he makes compelling arguments that these factors have *some* influence on human cultures, if they were *solely* determinative then contemporary global communications and migration would have wiped out cultural difference in a generation or two. Clearly, while contemporary communication has eliminated some cultures, it has not eliminated cultural difference.

A more deep-seated weakness in the bio-humanist account lies in the assumption that there are no significant differences between humans and other animals or even inorganic beings. Wilson writes, "Nothing fundamental separates the course of human history from the course of physical history, whether in the stars or in organic diversity" (p. 11). Yet almost every layperson, and every academic who is not a natural scientist, would find such a claim to be self-evidently false. Humans are different from stars and also from bacteria, and even from chimpanzees. This observation does not require a faulty glorification of human beings, but merely a recognition of material differences.

To focus our response on the opposition's weaknesses, however, is only a holding action. With each new example of the similarities between humans and animals, with each new discovery about the way in which neurons produce thought and emotion through physical processes, the bio-humanist's case becomes stronger, and more familiar. The claim that there is no fundamental difference between humans and other animals becomes more plausible. Yet, we in communication studies are uniquely positioned with the resources to refute the claim that humans can be comprehensively studied using only the tools of biology, and we can do so through constructive argument, for we know wherein the source of the fundamental difference lies. This necessitates, I believe, a fourth response to the bio-humanists.

AN ALTERNATIVE LINE OF RESPONSE

The response I am advocating is not one that I expect humanists and social scientists to find immediately comfortable, for it requires taking human biology seriously. It requires that we live up to our oft-professed belief in Kenneth Burke's definition of human beings as the "symbol-using animal" (1966, p. 3). I would revise Burke's label to the "symbolizing animal" in order to reflect feminist and post-structuralist emphasis that humans are as used by their symbols as they are users of those symbols (Condit, 1992), but Burke's insight is one that has breadth, accuracy, and utility. Human beings are animals, but our distinctiveness arises from the fact that our lives are so thoroughly governed, and enabled, by our symbolizing activities. I do not mean here to suggest that other animals do not use communicative signs, and perhaps even symbol systems, nor to say that humans are absolutely distinct (either inferior or superior) because of that. But there is a distinction of degree that matters. I am suggesting, therefore, that we need to begin to ask seriously what difference it makes that we are *both* symbolizers and animals. In order to forward such a line of research, in the rest of this discussion I will first identify a particular version of biological theory with which I believe traditional

human studies are compatible. I will then identify briefly why traditional human studies are compatible with that version of biological study. Finally, I will propose some ideas that might serve as prompts for research programs that would expand our understanding of human beings as both symbolizers and animals.

Biological Interpretation

One of the major reasons that humanists and even many social scientists have reacted with horror to the idea of integrating biology into accounts of human behavior is that biological accounts often embrace a deterministic vision. Wilson explicitly denies that genetic determinism is valid (e.g. p. 166), but he also repeatedly slips into fatalist vocabularies. For example, he says that "Paleolithic egalitarian and tribalistic instincts are still firmly installed. As part of the genetic foundation of human nature, they cannot be replaced" (p. 254). This deterministic vision of human biology is forwarded in two different lines of research—evolutionary psychology and behavioral genetics. These two accounts are mutually contradictory on a key point.

The deterministic vision of sociobiology or its replacement, evolutionary psychology, is the one most frequently repeated in popular science. This account holds that humans evolved in a narrow and specific Paleolithic environment. This environment laid down fixed biological programs in human males and females. Moreover, according to that story, there has been no evolution since that time, so that today male and female human behavior represents miscues attempting to run biological programs developed in a different context. From this perspective, all we have to do to understand human problems and behaviors is to figure out what the innate human programs are, in large part by considering what evolutionary functions they are grounded in.

The account offered by evolutionary psychology presumes either a single or sex-bifurcated set of genetic programs that determine fixed and shared patterns of human behavior. This assumption contradicts the other deterministic bio-humanist program, behavior genetics. Behavior genetics focuses on the genetic variability of human individuals. In the behavior genetics account, humans are each different from one another due to the fixed, but differing, genes that program them for different responses to shared environmental stimuli. On this account, some people are programmed to be highly neurotic, and therefore they are afraid of giving speeches, whereas other people are programmed to be extraverted, and they are therefore highly sociable. The behavior genetics account cannot be integrated with the sociobiological account, because the latter requires a single, uniform formative environment for all humans in order to gain explanatory authority for its stories.

These two popular deterministic accounts are not only based on contradictory assumptions, but they are also bad biology. They reflect what I call the "one cause, one effect" (or OCOE) model (see Figure 1). This inaccurately over-simplified model arises from common sense experience and physics envy, rather than from biological research. Biological systems operate instead on a "multiple interactive causes, one effect/one cause, multiple effects" basis (I call this the MICME model, after "multiple interacting causes, multiple effects" as a short-hand for the unpro-

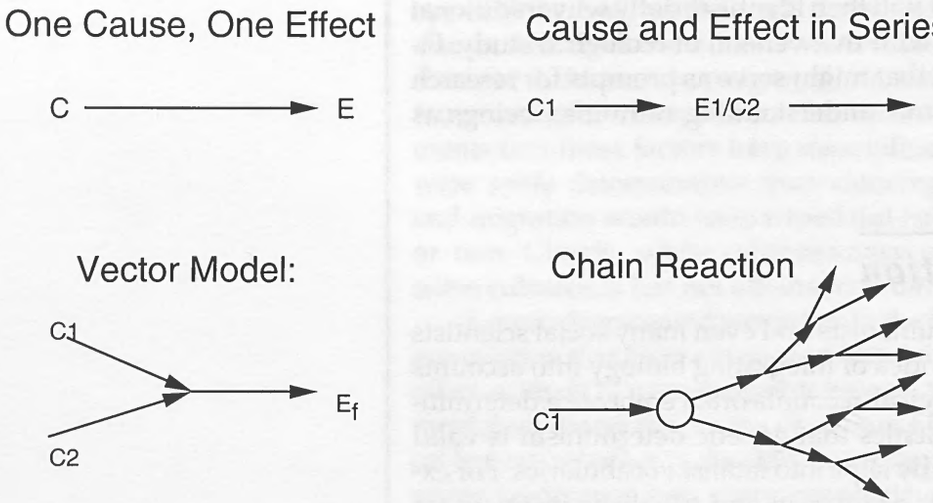

FIGURE 1: Modes of Causation: "One Cause, One Effect" Models

nounceable MICOEOCME; see Figure 2). In genetics today, this MICME framework has become integrated into the very vocabularies of study. The idea that one cause may have multiple effects is known in genetics as pleiotropy, and the idea that outcomes have multiple causes is known variably as "incomplete penetrance" or as a network approach to gene pathways. MICME causal relations are a product of the fact that biological beings are organized in interlocking networks of semi-closed multi-element circuits. This is a different organizational pattern from inorganic physical entities, and it has serious implications that, as Ernst Mayr (2004) has recognized, make the study of biological systems a necessarily distinct enterprise from physics.

Although the MICME model is more accurate than the OCOE model in describing biological systems, the deterministic vision of biology still has many adherents even within biology because it is methodologically

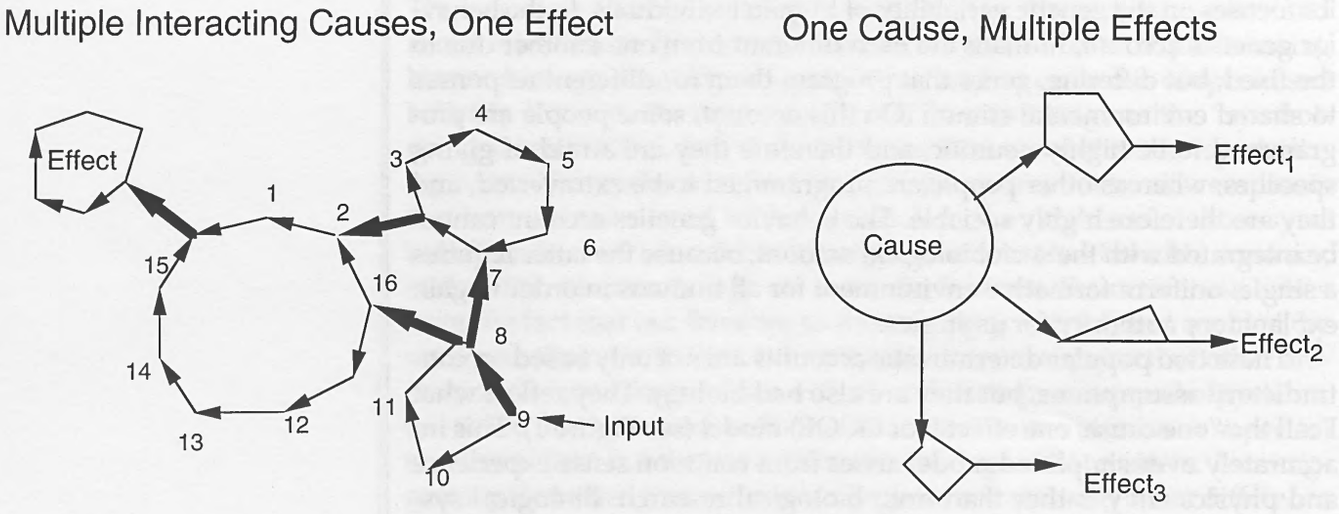

FIGURE 2: Modes of Causation: "Multiple Interacting Causes and Effects" Models

useful. Although biological circuits are composed of numerous interlocking pieces, and the sum is more than any of the parts, one nonetheless has to take apart the pieces to trace how any circuit works. OCOE approaches have produced a great deal of knowledge about biology that is then reassembled into more complex models. The problem is that the methodological way-station is too easily mistaken for the end-point of the journey. For example, the single base-pair substitution associated with sickle cell disease is usually offered as a model of the power of genetic research on the OCOE model. However, sickle cell disease is never a product of a single base-pair substitution. Sickle cell disease only occurs when a person has two copies of the gene that are non-functional. It takes a dual cause to produce even sickle cell disease, the textbook case of OCOE determinism! The framing of sickle cell disease within the OCOE framework instead of as a simple example of the MICME framework has caused endless confusion, and even contributed to genetic discrimination when public health campaigns have been undertaken to ameliorate sickle cell disease (Duster, 1990, p. 53). The mistaking of the utility of decompositional methods for the totality of explanation is no longer defensible.

OCOE accounts dominate the mass media for a related but somewhat different reason. One can convey single factor explanations more simply and quickly to a broad audience than one can convey the more complicated MICME accounts. Indeed, I would even suggest that the OCOE account is more consonant with our language systems than the MICME account, which means we will always be working up hill to promote the more accurate, but more complex MICME conceptualization.

Nonetheless, many biologists are increasingly getting clear about the fact that biological systems are different from physical systems (Mayr), and that biological systems are organized in interconnecting, developing circuits, and that therefore biology is rarely OCOE and usually MICME in its nature. This is fortunate for a program of true consilience (which my collaborator, Bruce Railsback, and I are calling "transilience"), because there probably is no way in which the traditional human studies could be articulated to a deterministic, OCOE account of humans as symbolizing animals. In contrast, it is quite feasible to give a MICME account of humans that treats both symbolizing and animality as substantive forces of human characteristics. An example of a MICME vision will help us think in an appropriate way about how one might integrate human symbolizing with our animal being.

Patty Gowaty and Steve Hubble have proposed a model they call DYNAMATE to explain when animals will exhibit choosy mate behavior and when they will exhibit indiscriminate mating patterns (unpublished ms., but see Gowaty, Holmes & Drickamer, 2003; Gowaty, Steinechen,. & Anderson, 2004; Johnson & Hubbell, 1984). Their model is the MICME alternative to the high profile OCOE argument that human males are evolutionarily (and hence genetically) programmed to be indiscriminate in their sexual practices and that human females are programmed to be highly discriminating (and hence usually monogamous). In contrast, Gowaty and Hubbel's model specifies that males or females of any species exhibit choosy or non-choosy behavior based on a series of factors that influence reproductive outcomes. These factors include how long the reproductive cycle is, how long it takes to find a mate, how likely you are to survive long enough to reproduce from a given mating, as well as the

fitness conferred from mating with low vs. high quality mates. On this model, either males or females may be choosy or indiscriminate depending on environmental conditions. Moreover, both species patterning and individual variability are inherent to this model because it is probabilistic. Each individual experiences the environmental conditions slightly differently, and so in many environments there will be some choosy members and some non-choosy members (of both sexes). However, there will also be mean tendencies in populations.

The model also explains data suggesting that, on average, human females are choosier than human males in most cultures, due to a particular set of shared environmental factors. The model thus simultaneously makes clear that in alternative environments, these patterns could change. From this MICME perspective, evolutionarily programmed patterns are not immutable regardless of environment, but rather are programs that specify patterns of response to different environments. Moreover, and of greatest significance to those interested in the role of symbolic inputs in human life, because the environmental cues are *judged* by the organism, there is an interpretative process involved in the production of particular behaviors. This creates the critical opening for linking accounts of symbolizing with accounts of biological nature. If the organism interprets the environment, and if some of the cues to understanding the environment can be symbolic cues, then there is a channel by which symbolic behavior can influence biological programs. At the least, symbolic behavior then may exert some, even dominant, influence on *which* biological programs run when. At the most, the symbolic input may be strong enough to *overwrite* the biological programs in significant ways.

To summarize, I am suggesting that a reasonable response to deterministic (OCOE) biohumanistic accounts of human behavior is that they are simply wrong, and perhaps persistent because their wrongness serves symbolic predispositions if not ideological ends. However, I am also suggesting that traditional humanists and social scientists need to give a more favorable response to MICME biological accounts. The MICME accounts are clearly superior to the OCOE accounts. The MICME accounts explain the evidence that is usually used to support deterministic biohumanist arguments at least as well as the OCOE account. Moreover, the MICME accounts can reconcile the contradiction between individual variability and social patterning in a way that the deterministic accounts cannot.

The MICME accounts are also compatible with a significant role for symbolizing. This compatibility means that biohumanism and traditional human studies do not have to be understood as competitors in a zero sum game, where one accepts either biological accounts or traditional human studies accounts, but not both. In the MICME model all animals interpret cues from their environment that influence at least some behaviors. The distinctive thing about symbolizing animals is that at least some of these cues come in the form of symbols. Symbols are at least quantitatively different from signs, because signs posit a more direct relationship between the sign and the environmental stimulus to which it is linked (e.g. "where there is smoke, there is fire"). Symbols, however, are interpretable in relationship to the other symbols by which they are contextualized. Thus "snake" can mean "freeze!" or in the phrase "you are a snake" it can mean, "you are a sneaky, dangerous, low animal," or in the phrase "snakeskin is in" it can refer to plastic purses and boots with mottled dark colors. I think that symbolizing actually evolved as a means of coordinating action, but

the requirement for interpreting signs in order to select programs probably created the biological platform for the development of symbol using.

Toward Research Programs Integrating Symbolizing and Animals

MICME accounts of biology and human symbolizing make compatible some specific versions of biohumanism with traditional human studies. However, in order to make this compatibility more evident and in order to forward a true consilience (rather than the disguised imperialism of the natural sciences proposed by most biohumanists), it would be advisible (not to mention interesting) to explore the ways in which symbolizing modifies the bio-behavioral routines upon which it is built. In some cases, this amounts to little more than articulating existing bodies of research to MICME accounts. In other cases, it will require new research programs, albeit ones based in symbolizing rather than exclusively in pre-symbolic biological factors. What I'd like to do in the last section is to outline three prompts for such research in the form of three ways in which symbolizing capacities modify biological programs. These include amplification, circulation, and fantasy.

Amplification and Specification

Symbolic capacities may amplify biological impulses. Modern warfare provides a clear example. Sociobiologists maintain that evolutionary processes constructed human beings as a pack animal that protects in-groups and is lethally aggressive with out-groups. They stubbornly continue to insist, however, that this Paleolithic pattern exclusively governs human behavior today. In a recent review, Herbert Gintis noted that "economic and biological models of self-interested cooperation are rarely plausible when they involve groups of *more than a few individuals*" (2004, p. 245). Anyone observing the history of modern warfare will recognize that humans cooperate well above the level of a few individuals. Modern wars are conducted through the organized efforts of millions of people, who are induced to cooperate with others thousands of miles from themselves, who they would never otherwise contact. Likewise, through symbolic means, these individuals are induced to define as "enemies" other people on the other side of the planet, people whom they would never otherwise have any reason to contact. Against these alien "enemies," they risk their lives or at least spend their treasure. The identification of this large, abstract, and distant people as a threatening out-group is accomplished through symbols, as is the construction of the self-protective in-group. Moreover, the ability to organize to execute such an effort is also enabled completely through symbols. OCOE sociobiologists must maintain huge blind-spots both with regard to the action of symbol systems and with regard to the existence of large-scale cooperation in order to maintain their story that human behavior is nothing more than their putatively original evolutionary programs leftover from the Paleolithic era. The inability of such an account to explain modern mass warfare obviously invalidates it.

It is important, however, for us to be able to explain *how* it is that symbol systems can possibly alter the scope of evolved programs without altering the physiological basis of the programs themselves. This occurs because symbol use is time and space binding. I deal in more depth with this feature of symbol using and what it enables elsewhere, but amplification is not merely a process of magnifying destructive or constructive power. Symbolizing capacities also amplify the counting and classifying capacities of animals by creating the possibility of specification.

An intense debate is currently going on about whether and to what extent the ability of human beings to count and classify are inborn programs or symbolic developments. Recently published research shows that without a number system, people are not able to count above two or three. Peter Gordon (2004) has shown that people of the Pirahã, an Amazonian tribe that does not have a numbering system other than "one, two or many," were not able to conduct matching number tasks. This research clearly indicates that access to symbols enables a specific addition to inborn programs—the conceptualization of exact numbers rather than relative magnitude.

The resistance to this evidence and its interpretation is instructive. For example, psychologist Charles Gallistel argued that the data did not show that human numbering capacities were not innate, but rather "that people do possess an innate, non-verbal ability to conceive of all numbers, and that language simply helps them to refine it" (Pearson, 2004; cf. Gelmand & Gallistel, 2004). Of course, in one sense, human beings do have an innate *capacity* to conceive of all numbers, or we couldn't do it at all. But language for numbers does not just "refine" a neurobiological substructure that has place holders for every specific number built into the brain. Rather, language enables a brain that is able to conceive of relative magnitude to track quantity as an exact (abstract) entity. Calling this "refinement" is very much akin to saying that an atom bomb is a refinement of a stone. The example of tensor calculus makes this even more clear. While it is true that in some sense human beings have the ability for tensor calculus, or none of us could do it, it is also true that there are no brain modules specifically allocated by evolution to tensor calculus due to some unfathomable need for them in the Paleolithic era. Instead, tensor calculus is a construction enabled by the combined sign systems of numbers and language on top of very basic evolutionary programs. As with numbers, so it is with all of the classifying abilities that language systems enable. The use of symbols permits a kind of absraction that binds time and space and that operates in a highly discrete fashion that is not accessible without symbol use. The resulting capacity for specification amplifies human behavioral capacities markedly. Symbol systems are thus enabled by basic evolved programs in the brain, and they do not erase these programs, but they amplify what those evolved programs can be made to do in dramatic ways that give animals with highly developed symbol systems very different behavioral options from animals that do not have such symbol systems at their disposal.

Circulation Systems

Symbol systems do not, however, merely amplify innate evolutionary programs. They also channel them through the construction of elaborate circulation systems. This channeling is possible because human beings

have a large number of relatively flexible biological programs that can be run at any one time, and a substantial part of behavioral determination is the selection of which program will be run at any given time and in any given sequence: is it mating or foraging time? is it time for rest or for preparing for the on-coming winter? is it a time for cooperation or a time for competition? Because humans use a vast number of interpretive cues to make these decisions, and because time-binding/space-binding symbols give access to a much larger range of information for those decisions, it is possible for symbol systems to enable the construction of truly vast institutions that channel human behaviors in response to intricate, long-term system demands instead of in the Paleolithic manner of response to local, immediate, biological states.

As a way into this difficult issue, imagine an average American's day. She wakes up in the dark to an alarm clock. The clock calls her to ignore her innate biological programming with regard to sleep cycles in favor of symbolically envisioned long term goals for eating, status, pleasure, or care of her offspring. She dresses and feeds herself and her children, and drives the children to their school complex, where they will spend 18 or more years learning about subjects as diverse as the organization of the solar system, thousands of years of human history in dozens of different cultures, as well as how to read, write, and calculate. None of these things were studied or known by Paleolithic peoples.

After dropping off the children, our everywoman enters a vast freeway complex, which channels hundreds of thousands of people, scores of miles from their den to a "workplace." The workplace is a part of another symbolic circulation system. If it is a "white collar" workplace, the day is spent almost entirely in the circulation of symbols. The "business" itself is constructed almost exclusively by the circulation of symbols. While the buildings that house the business may exert some influence on the character of the business and its occupants, it is the written legal contracts and organizational policies that define the business and thereby stabilize it as an entity. The business is literally a circuit circumscribed by symbols and defined by the flows of symbols that circulate through its networks.[1]

If the workplace is "blue collar" there are more tangible material objects around—the widgets that get sold and the machines that produce the widgets. The material properties of these widgets and machines exert perhaps a greater (or at least more visible) force upon the behavior of the workers there. But the business is still constituted by symbols—legal contracts and organizational policies. The behaviors of the individuals in the workplace are still directed by the flow of symbols that indicates who is a manager, and who will work which machine, and when lunch hour will be, and who will get paid how much of the symbolic currency that links the business intricately to the rest of the society.

Our worker's day will be programmed only indirectly by the biological needs to gain the food and the status that enables survival and reproduction. Biological needs will need to be factored in—lunch breaks and restroom breaks must be included. However, the activities of the worker's day will be most directly governed by the flow of symbols that is determined by the organization's circulation system. Where she will be at nine o'clock, with whom she will converse at ten o'clock, whether she will sit all day at a computer or a machine press, or spend all day meeting with strangers, all of these things are determined not by the interface

of local environmental conditions with biological programs embedded in the brain, but by the supervenient force of the circulation system of the symbolic world in which she lives.

Our worker will eventually go home to her family, which bears some striking resemblances to her Paleolithic ancestor's family, but also some striking differences. For example, she lives in New York, and her parents are over a thousand miles away in Florida. She is alive at forty-five, and has voluntarily decided that two children were sufficient. And just maybe she doesn't take any guff from her partner either. In any case, she may spend her evening vacuuming or cleaning her toilet bowl or she may spend at least some of it locked into her television set, which beams her news and fantasies from around the world.

The worker's day and the rest of her life is programmed not only directly and evidently by the symbol circulation system of her workplace, but also by the larger society. "Society" is a relatively abstract concept, but although society may not be as visible as a building, or as well specified as a "business," it is a powerful network of flowing symbols that guides each of our behaviors in every day and throughout the course of our lives in the industrial and post-industrial eras. These symbols are not immaterial ideas, but instead they exert a material force on people. If one is embedded in a society, one will be influenced by the particularities of the flow in some way, though the range of choices for response may vary.

Contemporary society is the total set of inter-locking symbol circulation systems of the now global human community. The linkages may be denser in some places—greater in cities than in states, greater in nations than in the global economy as a whole—but the inter-circulation is pervasive. We can only see it if we follow the flow of the symbols and detect the repetitive patterns that they make, thus identifying the circulation system.

I have been using the metaphors of inter-connecting circuits and a circulatory system to describe the flow of symbols and the way those symbols direct human behavior by cueing some evolved programs rather than others at particular times. But the term *circuits* and even *circulatory systems* may falsely connote two things: first that circuits affect flows but flows don't affect circuits, and second that the circuits are fixed and permanent. One may tend to assume that the circuit or system is independent of the influence of the flows that circulate within it: for example, that a biologically fixed circulation pattern determines the pattern of blood flows. This would be a false image. Even such biological circuits respond to flows, as blood vessels that aren't used become blocked and blood vessels that are heavily used grow larger, but symbolic circulation systems are even more malleable and dynamic. They are not fixed by some outside program, but rather are a product of give and take through a history of interactions. A useful corrective metaphor would be a flooding river. The flows of the river create a channel, and this channel simultaneously directs the flows of the river. Symbolic circulation systems are thus not static and externally determined, but the symbols flowing in the circulation pathways remake the pathways even as they follow them. Where biology is an emergent phenomenon, symbolics is a convergent one.

The interaction of evolved programs and symbolic circulation has sometimes been characterized as the co-evolution of gene and culture. This co-evolution is not taken seriously enough by those who insist that human beings today are bound to the genetic algorithms of the Paleolithic era. In

fact, we know that humans are continuing to evolve biologically. The rise of agriculture created in some parts of the world a genetic modification that enabled adult consumption of milk, perhaps as recently as 4800 years ago (Enattah, 2004). Movement to high altitudes has created genetic programs that facilitate the survival of children in low oxygen environments, and biologists are tracing the continuing spread of these genetic programs in Tibet (Maris, 2004). If physiological tendencies and capacities are evolving, there is no reason to believe that behavioral traits are not also evolving, as wars, social preference systems, and cultural enhancements influence survival and reproductive success. A socio-biological paradigm built on the assumption that human traits are and always will be Paleolithic traits is therefore a paradigm doomed to obsolescence, if not already obsolete.

Traditional Study of Symbolic Circulation

The traditional humanities and social sciences have made some substantial progress in identifying the flows and circulation patterns of symbol systems, and how they guide human behavior. But there is a great deal more that can be done. Rhetoricians, for example, have looked carefully at the social network, and identified numerous key features of how symbols flow. As very different examples consider Kenneth Burke's (1931/1961, pp. 123–183) description of the persuasive qualities of symbolic form, Jim Darsey's (1997) examination of the pervasive reuse of the prophetic form in American history, Campbell and Jamieson's (1990) accounts of the recurrent genres of U.S. politics, or Michael Leff's (1988) charting of the way in which the rhetorical action of a text moves an audience's frame from one position to an alternative one. For all the richness of these studies, however, they are snapshots that examine only one place or facet of the circulation system. Only recently have we begun rudimentary efforts to trace the movement of symbols through the system, as for example, the work of Sarah Wilcox (2003) and Bubela and Caulfield (2004) have shown not merely what shows up in the mass media, but the selection processes that siphon off only some of the flows from scientific discourse for re-circulation on the public screen. To be frank, tracing the flow of symbols, charting the patterns of circulation, is much more demanding than merely describing what symbols show up in a given locale. But if we are to understand how the social system directs our behavior, we need to understand the institutional flows, not merely the contents at specific way-stations.

Research in the area of organizational communication has done an even better job of tackling the circulatory systems of workplaces and other similar institutions. Network analyses, studies of the ways in which workers' identities are constituted through organizational rhetorics, and some relational studies, have made solid beginnings at understanding how organizations direct the behavior of their members through patterned flows of symbols (Taylor & Doerfel, 2003; Cheney; 1991). Here too, however, there is an enormous amount that we do not know. While we know that there are tall and flat organizational networks, for example, and that these feature different communication characteristics, our knowledge of these structures has been guided heavily by the prescriptive task of finding more efficient ways to do business, rather than by more general efforts to understand how these flows become constituted

and how they guide human behaviors. There is also an exciting opportunity for organizational communication studies to take the organizational-level tools and perspectives they have developed and expand and adapt them to inter-organizational circuits.

I do not know enough about family and interpersonal communication to have a good feel for the extent to which these areas of study have provided foundations that might already have described how symbol systems direct the behaviors of humans. My intuition suggests that this is the most conceptually challenging area for this kind of study. It is methodologically difficult to parse evolutionary forces from symbolic forces at the individual and familial levels. This difficulty is due in part to the fact that symbolic systems are inherently social rather than individual, so the difference they make is most evident at larger social levels. A difficulty also arises because evolutionary and symbolic forces have probably co-evolved most tightly at the familial level, so that distinguishing what is evolutionary and what is symbolic is impossible—the two are usually working toward a shared end. But perhaps this lack of optimism about the ability of familial and interpersonal studies to contribute to this research agenda reflects my own limited imagination, and scholars in this area will have compelling ways to link up symbolizing and biological proclivities. If so, it would be a most powerful contribution to the program of transilience that I would certainly encourage.

Fantasy

The final category of symbolic supervenience on biological systems that I will mention is fantasy. By fantasy I mean loosely to demarcate those realms where symbolic flows specifically pretend to denote not being outside their own symbolic realities. In our culture these include fiction appearing in television, film, and novels, as well as games, including video-games and all viewer-oriented sports.

The classic example of a fantastic being is the unicorn. There are no unicorns outside of the symbolic realm, but symbolizers have literally "made them up." They are symbolically made beings. The ability to make things that have no being outside the symbol system is a product of the time and space binding capabilities of symbolizing, as well as its physical arbitrariness. The average inhabitant of the contemporary U.S.A. spends an enormous amount of their time in this "made up" or fantastic realm. Although estimates that people have the television on 8 hours a day do not accurately denote levels of engrossment in the fantastic realm, it is probably reasonable to estimate that the average native of the U.S.A. spends at least 15 hours a week involved in the realm of fantasy.

Bio-humanists may ultimately make some contributions to our understanding of human participation in the realm of fantasy. Surely the domination of our screens by sex and violence speaks to the strength of sexual drives and the appeal of status dominance, if not to some biological program that fixes our attention on violence. Wilson has also tried to explain proclivities for particular colors and narratives as products of universal human programs. But long before bio-humanism, scholars in the traditional humanities had charted the recurrence of particular motifs in human myth systems or noted the way in which red in a painting draws attention and connotes differently than brown. The key findings

thus predate biological analysis. Moreover, biohumanism cannot cope with the demand for novelty that drives the realm of fantasy. While they might explain novelty-seeking as a biological proclivity, biohumanism's insistence that knowledge is only knowledge of theoretical generalizations leaves them without the tools necessary for gaining knowledge or understanding about the diversity that is the inevitable product of novelty-seeking. For example, bio-humanism will never be able to explain what particular combination of symbols will produce the next successful television series any better than can Hollywood producers. The producers, of course, have a terrible record, as most new television programs fold in or before the first season. The producers know the rules for success as well as the biologists could, but the challenge does not lie in assembling a set of generalizations about successful programs, but rather in implementing those rules in a successful novel combination.

The human ability and affinity for fantasy makes our behavior very different from our primate ancestors, at least in some ways. You don't see chimpanzees fixated in front of a television screen for hours on end. Studying chimpanzees and gorillas will give only the most rudimentary guides as to why Shakespeare is considered the best playwright of the Western world or why Toni Morrison is an award-winning novelist. These are significant human behaviors, and if we are to understand human beings, we must have academic work that treats these symbolizing behaviors in their own terms. The fact that fantasy appears to the Puritan or function-oriented mind as frivolous and non-functional is out-moded. Fantasy is a large part of what humans now do.

I must admit that it took me a long time to come to this realization. I was raised to think of sports and television sitcoms and rock concerts as intellectually debased (if not morally degenerate) escapes from "the real world." I could literally not conceive of a career in such an arena as sports broadcasting or make-up design. Those with more openness to the rise of fantasy as a major cultural and human force have done very well in the face of the academic and Puritan neglect of these trends. Historically, of course, we reserved a small place for "high" culture and its study, but only recently have we come to accord "popular" culture the same serious academic attention.

A substantial part of human behavior consists of fantasy, and we should therefore continue the development of ways to study the realm of the fantastic (though perhaps re-conceiving fantasy as a unique convergent product of symbol use may change how we study fantasy in some ways). This study, however, cannot rely exclusively, perhaps not even heavily, upon the tools used to study biological behaviors in other species. Because symbolic behavior is unique, this research will also have different goals from the theoretical goals of prediction and control that dominate scientific accounts of what knowledge might be. These alternate goals include the generation of innovation as well as the maintenance of cultural histories and the pursuit of evaluative comparisons. These differences in goals create the sharpest divide between the bio-humanists and the traditional humanists, and they are accompanied by differences in methods. Humanists use analogic reasoning and touchstones as much as they use equations and generalizations. Although these approaches are unfamiliar to scientists trained to study phenomena that have different characteristics, these kinds of knowledge are appropriate to the phenomena of symbolization.

Conclusions

Kenneth Burke called humans the symbol-using animal. E.O. Wilson calls us the "babbling ape" (p. 132). Both describe us with a dual character—an animal that speaks—but the differences in the two labels are telling. Wilson does not know how to take human symbolic capacities seriously. He hears it as babble. This accounts for his proposal for a program of consilience based on the displacement of the traditional humanities and social sciences with the biological study of human beings. Wilson's narrow program of consilience is not only uninformed and misguided, it is dangerous. Efforts to use the biological sciences to guide human societies have been tried before with disasterous results. And those results were not accidental. It is not a mere contingency if *understanding* human beings as nothing but animals results in *treating* them in ways no better than the domineering and disrespectful way we treat other animals.

I do not believe, however, that we can successfully repel Wilson's proposal for a narrowly based consilience with an equally narrowly based insistence on the independence of humans from our biological being. If we are the *symbolizing* animal, we are also the symbolizing *animal.* We still fight over resources, spend our adolescence focused on mating, and respond to the pushing of our primitive pleasure buttons by the entertainment industry. What is needed to understand the compound character of the symbolizing animal is a *broad* program of consilience, one that recognizes both the biological and symbolic inputs to human behavior.

Broadening the program of consilience will still permit the maintenance of independent research programs for biologists studying humans and for traditional symbolically oriented human studies. Such broadening also requires, however, research at the interfaces of these programs. To call this combined approach "transilience" is to value both the leap across the gap between disciplines and the bases of differences between the disciplines.

To forward work in the interfaces between biology and symbolics, humanists and social scientists need to be better at explaining the nature of the work we do and why the character of symbolizing requires work of that nature. We may need also to augment and revise research programs in light of the self-reflection attendant upon that clarification. On the part of the biologists, a program of transilience requires that they learn a lot more about symbolizing and exhibit a lot more respect for the new areas in which they would tread. The fact that the humanities and social sciences seem chaotic to a novice outsider is as likely to be a comment on the outsider as a comment on the deficiencies of the modes of study. On the other hand, the contemporary state of knowledge in the bio-humanities equally puts a burden on humanists and social scientists. We can no longer afford the insularity of ignorance about the biological inputs to human beings. Nor can we afford the arrogance of presuming that it is *only* text all the way down. Moreover, a few of us may be up for the challenge of generating a new kind of human studies, which explores the places where biology interfaces with symbolics. Perhaps we will examine the processes of amplification or the biocultural convergence processes of the flows within circulatory systems, or the interactions between individual biology and the fantastic realm, or other phenomena. The ability to address these interfaces is enabled by new

understandings of biology as interlocked circuits that change with environments rather than as simple deterministic objects. No longer does biology imply fixity or nonresponsiveness to symbols. This moment is an important one. The fate of traditional human studies is unsecured. We face a well-funded, sometimes well-argued initiative to displace us from the comfortable slot in the academy we have inhabited during the entirety of my intellectual lifetime. Change is, of course, an inevitability for a symbolizing species. It nonetheless behooves us to direct our attention to the changes that are brewing and to apply our symbolic capacities to reshaping the flows of discourse that are remaking the academic circuits that will channel the symbols we symbolizing animals will share in the future.

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[1] I borrow the metaphor of "flows" from Deleuze and Guattari (1983/1996), but I put it to my own somewhat different usages.

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