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Why Anthropomorphize? Folk Psychology and Other Stories

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INTRODUCTION

In the early sections of *Lectures on Conditioned Reflexes,* Pavlov (1927/1960) tells how he and his assistants puzzled over the behavior of a dog in an experiment. Every time the assistants tried to tie it into its harness, the dog put up a struggle. What caused this behavior? After weeks of thought and discussion, Pavlov and his assistants finally stumbled on the answer: the freedom reflex. Our interests are less in whether dogs have a freedom reflex than in why people—including an early saint of behaviorism—might conclude that they do.

We sketch three accounts of why humans anthropomorphize:[1] anthropomorphism may result from a cognitive default; the perception of overlapping species coordination systems; or a human, species-typical coordination system. The stories illustrate a central point: whether or not humans can know about the mental states of animals is connected to what we believe about human mental states. Beliefs about human mental states influence, and are influenced by, beliefs about the possible attributes of other entities. (At one time, for example, playing chess at a grand master level would have indicated intelligence in computers; today intelligence is the ability to understand a story at the same level as a toddler.) The appropriate question for readers to ask themselves then is not which account is true, or whether one account says animals have mental states while another does not. It is, rather, how useful is one or

another account given readers' multiple agendas, be they philosophical, behavioral, psychological, political, or any combination thereof. The three accounts are not mutually exclusive. In fact, elements of each might someday be combined into a theory of context-based mental state attribution. What we do doubt, however, is that any such theory could profitably be grounded in a belief that human cognition is ahistorical, neutral, disembodied, and unbiased by nature or training.

Attributing human characteristics—specifically mental states—to nonhuman entities is pervasive among humans. All cultures have metaphors relating humans, animals, and other entities. Anthropomorphic thinking is characteristic of children, who also show developmental shifts in its use (Inagaki, 1989; Inagaki & Sugiyama, 1988). Anthropomorphism has properties of scale, persisting for the few seconds that a car fails to start or the dog "looks guilty," or for centuries, in various beliefs about a diffuse causal agency in the universe and the human attributes of trees, rivers, and animals. People implore cars to start, dance to cause the rain, and threaten computers. Some authors allow that anthropomorphism may be "built-in" to the human repertoire, but they disagree about the consequences. Kennedy (1992) views an anthropomorphic tendency as a liability, hopelessly distorting our understanding of animal behavior and requiring prophylactic action. Fisher (1990) suggests that humans may have innate conceptual frameworks for understanding humans and other animals and that their *rejection* leads to distortion. Interestingly, neither of these positions denies that humans "naturally" anthropomorphize.

Other authors assume that the attribution of human characteristics to nonhumans is not anthropomorphism at all. Instead it is either veridical (Griffin, 1984; Povinelli, 1987) or at the very least "conceptually innocent" (Dennett, 1978)—a way station enroute to a better understanding of how biological systems are designed:

> Once we have tentatively identified the perils and succors of the environment (relating the constitution of the inhabitants, not ours), we shall be able to estimate which goals and which weighting of goals will be optimal relative to the creature's *needs* (for survival and propagation), which sorts of information about the environment will be *useful* in guiding goal-directed activity, and which activities will be appropriate given the environmental circumstances. Having doped out these conditions (which will always be subject to revision) we can proceed at once to ascribe beliefs and desires to the creatures. . . . It is a sort of anthropomorphizing, to be sure, but it is conceptually innocent anthropomorphizing. (Dennett, 1978, pp. 8–9; cf. Dunbar, 1984)

Just as assumptions of natural anthropomorphism presuppose a cogni-

tive apparatus with certain features (a tendency to anthropomorphize), conceptually innocent anthropomorphism presupposes a cognitive apparatus that can be neutral and unbiased. Scientists might make errors, of course, but errors would be more or less randomly distributed and certainly not biased toward attributing human characteristics to nonhuman entities. Conceptual innocence and neutral cognition also presuppose that science is generally unaffected by its social context. In particular, the values we place on animals would not influence the beliefs and desires we attribute to them. These are familiar, everyday beliefs about science. However, a mass of research by psychologists shows that humans deviate from ideals of neutral rationality (Kahneman, Slovic, & Tversky, 1982; Faust, 1984; Dawes, 1988), and work by historians and sociologists of knowledge shows that science divorced from its social context is a chimera (Latour, 1987; Pickering, 1992). Although human cognition and the social context of science potentially interact with any scientific inquiry, anthropomorphism appears to be a special case: its elimination was a critical condition for the emergence of modern science (Hansen, 1986).

Still, even if conceptual innocence is improbable, that would not mean anthropomorphism is automatically dangerous or merely unproblematic. Assessing its impact demands more than a better understanding of human cognition—it requires establishing the kind of relation that exists between human minds and animal minds. Currently that relation supposes that folk psychological concepts can be applied to other systems (be they animals, machines, infants, or other humans), and existing debates ensue from that starting point. We suggest that multiple diverse starting points can break the repeated recycling of anthropomorphism's problems and prospects described by Mitchell (1996).

In the following sections, we present three accounts of anthropomorphism. Our first two accounts are intuitively plausible and could be inserted into ongoing debates about animal mental states without severely distorting folk psychological intuitions; the third is plausible, but not intuitive. It arises from the challenge scientific social psychology poses to folk psychology. All three accounts assume "selection for sociality," a scenario for the evolution of human mental systems (Caporael, Dawes, Orbell, & van de Kragt, 1989). The scenario proposes that human mental systems are specialized for face-to-face group living, and that the interface between individual and habitat is a group process. Consequently,

> the human mind/brain evolved for being social (and for learning what that means in our cultures) and not for doing science, philosophy, or

> other sorts of critical reasoning and discourse . . . We expect and find cognitive limitations especially under conditions of uncertainty . . . These limitations contribute to and interact with various sociocultural constructions including folk psychological notions of "human nature." . . . Cognitive limitations and the ruses of culture may be overcome to some extent by education, environmental feedback or "collective rationality" . . . (Caporael et al., 1989, p. 730)

Drawing on empirical research in psychology, selection for sociality differs from the "evolution of social intelligence" program in important respects. Specifically, it challenges assumptions that behavior can be explained in terms of genetic or individual self-interest, that group behavior is the aggregate of individual exchanges for mutual benefits, that humans engage in complex calculations about their own and other's self-interests, that humans are "natural psychologists," and that "cold cognition" or "technical intelligence" is independent of or qualitatively different from social cognition (Alexander, 1989; Byrne & Whiten, 1988b; Humphrey, 1986; Dunbar, 1984). Selection for sociality is a minimalist scenario—it does not assume folk psychology provides an adequate description of behavior; it merely sets a stage for asking what are the minimal cognitive requirements to negotiate life in social groups. Hence, there is no single "just-so" story about how anthropomorphism was "really" advantageous in the past. Instead, the scenario is used to generate three speculations about the psychological foundations of anthropomorphism.

THREE ACCOUNTS OF ANTHROPOMORPHISM

Anthropomorphism As a Cognitive Default

The idea that anthropomorphism is connected to a peculiarity of human thinking—a type of cognitive default rather than a veridical perception—underwrites much of the controversy about animal minds, although the peculiarity is seldom specified in much detail ("projection" being a common explanation). C. Lloyd Morgan, in his criticisms of George Romanes's comparative psychology, explained anthropomorphism as "ejective psychology"—the conscious and superficial bits of an observer's personal psychological states flung onto other humans or animals (Richards, 1987). The observer's various "subconsciousnesses" were the product of past experiences, bodily sensations, and others' perceptions of the observer.

Positing an evolutionary scenario similar to selection for sociality, Humphrey (1976) proposed humans possessed a distinctive "creative

intelligence," which originated in "the social function of intellect." Individual self-interest was tempered by a sympathetic identification whereby an actor would take another's goals as his own. Social cognition was a "'constraint'" on reasoning, "such as might result if there is a predisposition among men to try to fit nonsocial material into a social mould [*sic*]" (p. 312). Thus, sacrifices and rituals were attempts to bargain with nature, but "nature will not transact with men; she goes her own way regardless—while her would-be interlocutors feel grateful or feel slighted as the case befits" (p. 313). Backing off from this claim a bit, Humphrey asserted that, in fact, nature does sometimes respond. The "relationship of a potter to his clay, a smelter to his ore or a cook to his soup, are all relationships of fluid mutual exchange, again proto-social in character" (p. 314). Technical skill was built upon the foundation of social activity, not distinct from it. In its "descent with modification," Humphrey's novel and distinctive hypothesis was transformed into a familiar folk psychology: the social function of intellect, which was originally to hold society together, became a "Machiavellian intelligence" for manipulating conspecifics in one's own self-interests. Technical and social intelligence were recast as distinct and separate, with an overt warning not to use social intelligence to explain all primate social behavior when comparing the two intelligences (Whiten & Byrne, 1988, p. 50).[2]

A decade after Humphrey's (1976) seminal paper, the social function of intellect was revisited in another context—attributing human characteristics to machine intelligence. Caporael (1986) argued that anomalies such as anthropomorphism or cognitive limitations could be used to make a plausible case that human cognition was fundamentally social cognition. She proposed that anthropomorphism was a "cognitive default" engaged when explaining or predicting the behavior of an entity was important, but no handy explanation for its behavior was immediately available. Anthropomorphism would have a variable time scale, from the desperate moments one spends begging a stalled car to start, to the centuries of custom soliciting supernatural aid. From an evolutionary perspective, attributing human characteristics may be part of a psychological *Bauplan* (process) originating in selection for sociality, and development involves the process of learning when not to default. Piaget (1929/1967), for example, concluded from his work on childhood animism that universal life is the primary assumption of child thought. The attributes of inert matter are gradually detached by thought and experience from the primitive continuum along which all things are living. The argument for a cognitive default is more clear-cut in cases where an entity is inert or "non-life," such as natural systems or

computers. Anthropomorphic attributions drop out when an alternative language for describing phenomena becomes available—for example, auto mechanics, computer programs, or weather forecasting.

Sellars (1963) has argued that scientific discovery begins with anthropomorphism. As continued attribution of human characteristics fail to result in effective interactions with nature, other explanations or explanatory metaphors may be sought, giving rise to a more adequate theory. Given that feedback from the environment is frequently irregular (e.g., sometimes it does rain after a rain dance), it should not be surprising that anthropomorphism can persist for long periods of time. A phenomenon may require focused attention as well as new cultural metaphors in order for an alternative explanation to arise. For example, Kepler initially described astronomical phenomena in terms of an intelligent sun that forced planets around violently; it also would languish and grow weaker because of the remoteness of virtue (gravity). Only later did he find another vocabulary that allowed him to envision a celestial machine that works like a clock in which a weight drives the gears (Gordon, 1974). One of the reasons Aristotle's physics is "foreign to the modern mind" is that it is an anthropomorphic one where bodies fall because they seek a specific natural resting place (Wiser & Carey, 1983).

Whatever the specific details of anthropomorphism as a cognitive default, we are left with a conundrum. The hypothesis suggests we are subject to being hopelessly confused about the existence of nonhuman minds because we will default to attributing human characteristics whenever the going gets rough. The characteristics attributed to animals may or may not exist, but it would take clever experimentation with strict controls to distinguish the operation of their minds from that of our minds.

Overlapping Interspecies Coordination Systems

Like humans, the members of many other species must coordinate their own behavior with that of their conspecifics. They must know when to feed and protect their young, when to avoid a conspecific, and when to approach one. Presumably, appropriate coordination systems would evolve, and at least some systems would overlap, allowing for a sort of "trans-specific recognition" of mental states (Gallup, 1985; Povinelli, 1987). An analogy with human behavior would be the cross-cultural interpretation of smiles indicating approachability and frowns indicating avoidance. Some years ago, one of us (L.R.C.) observed her son, then five years old, interact with a one-year-old orangutan. The pair,

who had never interacted with juveniles of each other's species before, executed an "invitation-to-play-by-imitation," initiated by the orangutan and complete with turn-taking, escalation, and variation of imitation. The behavior was identical to the ritual performed by four- and five-year-olds on playgrounds every day. The exchange suggested the possibility that baby humans and orangutans might possess procedural rules appropriate to their own species, but still recognizable and functional across species lines.

Another possibility is suggested by a study undertaken by Berry, Misovich, Kean, and Baron (1992). They used the well-known Heider and Simmel (1944) animated film to elucidate the stimulus properties that give rise to anthropomorphic distinctions. The film shows a big triangle chasing a little triangle and circle around and inside a house (a rectangle with a moving-flap "door"); the little triangle locks the big triangle in the house, which explodes. (Among the many possible reasons for anthropomorphism, economy of description must be one.) Subjects watched an unaltered version of the film as well as a version that disrupted the motion and one that disrupted the shapes. The results for the unaltered film replicated Heider and Simmel's findings: not only do people anthropomorphize the geometric shapes moving on the video screen, they agree on the gender of the moving forms and on a story of aggression, rescue, and escape. Disruption of shapes reduced, but did not eliminate, anthropomorphisms; however, strobe-like stuttering disruption of motion patterns did. Clearly, dynamic transformations are used as evidence of intentionality, but cannot be used to distinguish "real states" from supposed ones.

Evolutionarily, there could be two accounts for overlapping coordination systems. The overlap may be a result of common descent (hence, we could imagine human and orangutan juveniles possessing the same or similar procedural rules). But overlapping coordination systems could also arise from convergent evolution, which would have to be the case for dogs and dolphins as well as other animals (which would make the dynamic transformation hypothesis especially interesting). Positing overlapping coordination systems implies that comparative analysis would be a useful enterprise for determining what common environmental features in the past, given current developmental trajectories, might account for a convergence of coordination. An immediate consequence of this scenario is that the case for mental states where neither homology nor analogy could be invoked (e.g., birds, spiders, etc.) imposes a special burden of explanation to demonstrate that the attribution is not garden-variety anthropomorphism.

Two related complications seem noteworthy. In the boy-

orangutan illustration, attributing the desire to play (which the surrounding adults did) was the outcome of observing an ordered sequence of responses. That is, the adults attributed the intentionality after the sequence; the juveniles were simply responding to each other directly. Neither may have attributed to the other a desire to play as the basis for the interaction. Hence, coordination systems may not require attributions of intention at all but simply be a meshing of two systems in an on-line exchange. This would leave the intentionality attributions of the adult observers "dangling" so to speak; at best a linguistic summary of a past event lying outside the coordination system itself. To bring attributions of intention inside the system would require they be involved in the production of behavior, not be merely the linguistic detritus left over from an interaction sequence. But this would leave unexplained the reasons why the adults spontaneously agreed the juveniles wanted to play. In other words, if attributing intentions, beliefs, and desires does not function in an interaction, how do we explain the attributing activity, which itself is fairly complex and seems like it should be useful for something?

Dog trainers—ordinary people who train other ordinary people to interact with their dogs—are real-life, practical demonstrations of cross-species coordination that merit research. A good dog trainer is an intermediary between two species. She discourages her human trainees from attributing "high level" human intentionality because it interferes with dog training. Attributing jealousy, fear, or protectiveness to the dog does not help reduce growling when someone comes to the door. For example, the dog owner, believing Rover is jealous, reassures him by patting his head when he growls at the doorbell—an instrumental conditioning procedure that increases the frequency of growling. The expert trainer teaches the novice human two important lessons. The first is how the owner should behave so that the dog will "caninemorphize" her. Lesson one in dog-training school usually concerns a discussion of how the owner behaves so that Rover recognizes that she is his pack leader. Pack leaders go through doors before the pack; they can take food from pack members plates, but they never, never permit pack members to take food from their plates. Without emotional yelling and screaming, pack leaders make pack followers lay down in one place for a long time for no other reason than that pack leaders are pack leaders because they enforce their will. Now one result of this descriptive exercise is that it is very clear that to describe behavioral coordination from the point of view of an animal is almost impossible without imagining that the dog is also a folk psychologist (with a somewhat different agenda).

But to actually predict and control the behavior of the dog—essential to training—the owner must be trained as an effective behaviorist. In scientific circles, this is usually conceived as something psychologists do *to*, rather than *with*, animals. In dog-training circles, behaviorism is conceived as a "a loop, a two-way communication in which an event at one end of the loop changes events at the other, exactly like a cybernetic feedback system" (Pryor, 1984, p. 15). It requires acute attention to the "perils and succors" the species has faced in the past. The pack leader has to be taught to run *away* from the dog if it fails to respond to the "come" command (followers follow, and pack leaders never repeat their commands). Children must be watched carefully around adolescent dogs because a child's darting motions resemble the darting motions of prey. In addition to the behavioral propensities of species and breed, the owner is taught to watch carefully for cues indicating the dog's immediate state. A yawning dog is not a sleepy dog, but a dog under stress.

As the last example suggests, there is a fuzzy distinction, but a distinction nonetheless, to be made between anthropomorphism and understanding the behavioral propensities of an animal. However, it occurs at the level of situated action, played out through response and counter-response (Mitchell & Thompson, 1991). The application of human folk psychology (yawning indicates a desire to sleep) fails to lead to behavior appropriate to the coordination system. The term "stress" is arguably anthropomorphic, but in context (a critical qualification) it summarizes in dog-trainer language the experience of past contingencies. It functions to predict a framework for future contingencies because it constrains the trainer's behavior: a stressed dog will not work well and some other action must be taken. This account allows that some apparently anthropomorphic behavior in humans may not be real anthropomorphism at all. It represents, at a behavioral level of response contingencies, an overlapping among coordinative systems, which may have arisen through common descent (e.g., boy-orang) or through each species having common goals arising through interaction with its relevant milieu. The resultant "common features" may be "read" across species lines, and hence, coordination can occur. This understanding of anthropomorphism is sympathetic to the scientific "critical anthropomorphism" advocated by Burghardt (1985a), but it suggests a particular methodological approach frequently abjured in the investigation of mental states—a behaviorist approach. As Pryor (1984) observes, "Knowing nothing about a particular species but knowing how any subject tends to react to various training events, one can learn more about the nature of a species' social signals in a half hour of

training than in a month of watching the animal interact with its own kind" (p. 167).

Species-Specific Group-Level Coordination System

The cognitive default story allowed that folk psychology might be predictive, and defaulting was an epiphenomenon of an otherwise useful "theory of mind." The overlapping species coordination story was somewhat less sanguine, suggesting anthropomorphic attributions were dangling outside the system. They worked to some extent under some conditions as summaries of past behavior, and only as a summary constraining the possibilities for future behavior could anthropomorphism be said to predict behavior. Suppose, however, that we exercise our minds like the White Queen by believing impossible things for a half hour each day (Millikan, 1993), and believe that folk psychology is *not* predictive. We are left with a curious situation: millions of humans talking about beliefs, wants, desires, and motives in widely shared ways *as if* such things were descriptive and predictive, at most arguing about *which* motive is salient, or *what* desire was being pursued, but rarely doubting the validity of the enterprise as a whole. Suppose further that the enterprise, whatever its validity, is so complex and well designed that it appears to be something that should have a function. If not succinct description and prediction, what could that function be, and how might anthropomorphism be related to it?

Our "curious situation" might not be so impossible after all. If the value of intentional description of behavior is that it predicts behavior, it would imply that people's "thoughts and feelings"—needs, wants, and desires—would be informative about behavior, and conversely, behavior would illuminate thoughts and feelings. But this very commonsensical assumption is undermined by behavioral research. Not only do people believe thoughts and feelings are *more* informative than behavior, they are significantly better at predicting thoughts and feelings *given thought and feeling information*, than they are at predicting behavior on the same basis (Andersen & Ross, 1984; Andersen, 1984). Moreover, given behavioral information, people are biased toward attributing dispositional factors as its cause and overlooking situational factors, a widely studied phenomenon known as the "fundamental attribution error" (Jones, 1990; Ross, 1977). If the accurate perception of causes in the immediate past is difficult and easily compromised (e.g., by changes in lighting or the color of clothing—Taylor, 1982), the prospects for accurate predictions of future behavior are not promising. If attributions of intentionality in the conventional folk psychological

sense fails to predict human behavior, what else could folk psychology be *for*?

Our minimalist scenario asserts that human mental systems are partly an outcome of selection in groups. If humans are obligately interdependent—obligately social—they require some system for the coordination of behavior. (Pheromones, for example, help coordinate behavior for obligately interdependent social insects.) Talk of intentionality—folk psychological talk—might be a modern instantiation of such a coordination system, a group-level adaptation that is at best weakly connected to individual behavior. Whatever accounts for the behavior of individuals is not motives, goals, intentions, and desires, but some other property or set of properties emerging from ongoing interaction with the environment. Folk psychological talk would organize all the bits of ongoing organism-environment interaction so that behavior would be coordinated. What could folk psychological talk be doing that it could result in behavioral coordination? The clue is in the talk more than the folk psychology.

We deliberately used the word "talk" rather than "language" in the previous paragraph to draw attention to everyday discourse. Everyday talk by ordinary people is "about-talk"—largely concerned about who did what to whom and about what things (shoes, sports teams, dog breeds, weather, ideas, etc.) are good and bad. (Science, philosophy and other sorts of "cold cognitive" critical discourse is derivative [Caporael et al., 1989; Zajonc, 1980].) These are matters of value, not merely of description. Talk has connotative functions in addition to denotative functions and provides an orientation along a good-bad, approach-avoidance dimension for interacting with components of the material and social environment. Connotative functions are privileged: affect frames information content and lingers after content vanishes. People have "first impressions" of liking or disliking other people before an interaction even occurs; they remember disliking or liking a book long after its story or argument has been forgotten. In fact, humans are capable of judging whether or not they like a stimulus even if they cannot identify it, evidence of the primacy of value in perception (Zajonc, 1980). Perception itself is a value-realizing, value-organizing activity.

Even as simple an artifact as a toddler's spouted cup, weighted on the bottom to discourage spilling, connotes a value on independence and self-sufficiency consistent with a culture with early weaning and training for independence (Hodges & Baron, 1992). Indeed, the mere existence of such a device (one of many possible designs for transporting liquids to the mouth) contributes to the direction of the parent's child-rearing activity, influences the child's development, and rever-

berates through the culture, constraining other activities. Just imagine the clucking that would occur if a woman in an industrialized country were to breastfeed a three-year-old. Humans live in a value-saturated environment. Talk is an ongoing, nonstop negotiation of value that is translated into interaction in a world where "the social" actively interacts with "the material" (as in the toddler cup example). Talk about beliefs, intentions, and desires (folk psychology) develops a context for behavior that limits and entrains what actions are conceivable, possible, undesirable, and essential.

In a nutshell, the way folk psychological talk enhances coordination is that it prescribes values, which are realized in the activity of ongoing organism-environment interactions; and values coordinate behavior because they limit the degrees of freedom for potential interaction. Folk psychology orients actors toward a widely shared version of common sense, but one that is always subject to negotiation and revision.

From this perspective, attributing human characteristics to animals is a way of changing the values we place on them and how we can behave toward them. Anthropomorphism is part of changing social values; specifically, we suggest, values related to the environment and animal rights, a connection made by several chapters in this volume. Two decades ago, agnostic defenses of anthropomorphism, much less spirited ones, were largely inconceivable for scientists (see Mitchell, 1996). There was little talk about animals in the larger culture, and constraints on interactions with them were largely associated with animals in the pet category. From primates to rodents, animals were simply one of many components in a mechanistic "Newtonian ecology" that oriented human interaction with nature in terms of utility (Boucher, 1985). Changing this perception requires changing values and perceptions in both science and its social context. Before wading into deeper controversial waters, we want to make perfectly clear that our comments are speculative, meant to engender both research and dialogue on the complex relation between science and society.

Based on a random survey of over 400 animal rights activists, Jamison and Lunch (1992) showed that not only are environmentalism and animal rights functionally related, but that they are also part of a larger liberal and egalitarian social agenda. Additionally, animal rights activists had extremely negative views of scientists (in marked contrast to their views of environmentalists or feminists), ranking scientists with businessmen and politicians, perceiving them as symbols of traditional authority. Over 50% of respondents believed scientists did more harm than good to society. Although the top leadership in the animal rights

movements disapprove of pet ownership, and often seem careful to emphasize that their positions are not based on mere sentiment, Jamison and Lunch (1992) found that "intensely emotional experiences with pets" were a significant mobilizing force for the rank and file. Although animal rights movements have occurred in the past, associated with reactions against technological change and exploitation of nature, we suggest anthropomorphism links scientists and like-minded scholars with environmental/animal rights issues in the larger society. An enterprise for "the scientific study of animal minds" creates a floating island between two apparently opposed and hostile communities as well as a refuge and recruitment center for pro-activist scientists and pro-science activists. With the express purpose of demonstrating human-animal continuity, explicitly justifying values for preserving the environment, and promoting humane and egalitarian relations, animal minds research, but not anthropomorphism research, may be a vehicle for changing value-making talk and value-realizing perception.

At this point, some readers will be wondering whose side we are on. We see dangers in the traditional historical privileges of the scientific community, predicated as they were on the privileges of gender, race, and class. For precisely the same reasons, we are uneasy in principle with appeals for social and political values that begins with "science shows. . . ." No matter how much we agree with the values on behalf of which such appeals are made, "science shows . . ." has also been engaged, sometimes successfully, for a variety of discriminatory, noxious, and even deadly social agendas because scientists have special authority in scientific culture. We agree that scientists are not value-neutral, and that values have an important role in critical inquiry and scientific criticism (Longino, 1990); but as we argue in the next section, we believe values should be the products of interactions amongst citizens (who might use scientific information), not of interactions among "scientists" and "ordinary people."

Traditional Newtonian ecology is undergoing a crisis, which Boucher (1985) attributes directly to the environmentalist movement. Students entering ecology in the 1960s were *politically* concerned about environmental issues, and found Newtonian ecology insufficient because it "failed to express the *value* of the environment" (Boucher, 1985, p. 22, emphasis added). Similarly, scientific discussions about animal minds and intentional states are associated with values concerning animal rights and environmentalism (Morton, Burghardt, & Smith, 1990; Plous, 1993a). Bouissac (1989) points out in his call for a scientific "neo-animism" that anthropomorphism is crucial to "the most fundamental dilemma of our time: whether the ever-growing exploitation

and control of the environment is worth the risk of its continuing alteration and even annihilation" (p. 498). To attribute human characteristics to animals is a negotiation of value among humans. It changes the way humans perceive animals, and limits and entrains what actions are conceivable, possible, undesirable, and essential.

CONCLUSIONS

Allow us to confess right off: we have no conclusion. We cannot say if anthropomorphism is "really" triggered by ignorance (the cognitive default story), a summary of tentative "predictions" reflecting something "real out there" (overlapping species coordination systems), or a value-making activity of obligately social creatures organizing themselves in a complicated world. We do assert that whatever anthropomorphism is, it is too complex, too multiply stranded, to expect it to be "conceptually innocent."

Clearly, research distinguishing among these accounts would not establish which systems, if any, have mental states. Nevertheless, research on anthropomorphism would have implications for the conduct of empirical investigation on mental state attribution. If anthropomorphism is a cognitive default strategy, then by using effort and imagination to formulate and test alternative accounts of behavior, it should be possible to dislodge anthropomorphic accounts where they are inappropriate. If anthropomorphism arises from shared coordinative strategies, it may be more difficult to dislodge through scientific inquiry. If anthropomorphism is value-making, scientific methods may reveal that an anthropomorphic account of behavior lacks descriptive and/or predictive power relative to some alternative account, but the same methods cannot be used to assess the evaluative function of anthropomorphism. The last possibility suggests a dilemma that should not be overlooked. If anthropomorphism is connected to environmentalism, as we among others suggest (albeit for different reasons), and if it does constrain destructive action in our relation with nature, then empirical ambitions for the discovery of mental states may ultimately be irrelevant. Even if technological fixes were developed to reverse environmental destruction, they would require large-scale shifts in world views (read "values") to be translated into collective behavior (Bouissac, 1989). Anthropomorphism may be an important means for connecting values to action for environmental preservation, and too important to discourage, whatever its foundations, and whether or not animals really do have mental states.

We do, however, make a plea for preserving the integrity of both science and values. Scientists do not need to demonstrate that animals have minds (a scientific question) in order to assert that the destruction of nature or the abuse of animals is wrong. The danger of not separating these issues is in conflating scientific values and common sense values—with both being the worse off for it. Rollin (1989, this volume), for example, urges science to follow common sense: animals appear to have mental states, and should be treated accordingly. However, if we insist that science conforms to common sense, we risk losing the identity of science, which in our view is a fallible set of heuristics for finding out how things work despite how they appear to our common sense. Taking the opposite tack, Cavalieri and Singer (1993) assert that there is enough scientific information to make the moral boundary between great apes and humans indefensible. There is a fine line, however, between using research results to inform common sense, and invoking scientific authority to justify it or indicate what it should be: even strong proponents of Cavalieri and Singer's (1993) agenda, proponents intent on "slaying" dissenters, recognize the existence of scientific dissent (Bekoff & Allen, this volume). Our concern is this: If scientific authority is allowed to colonize or subordinate common sense, we risk losing uses for common sense. Common sense, which combines value-making talk and value-realizing perception, is for negotiating and adjudicating our collective moral, social, and political lives. What language and what authority will ordinary citizens have to do this work, particularly if their opponents are scientists? If moral boundaries can be eradicated by "scientific information," what keeps them from being erected with the same justification? "Naturalized" by scientific authority, be it psychology or biology, common sense could no longer serve Everyman and Everywoman through the negotiation of action-organizing values, but would be shifted instead into the hands of science.

NOTES

1. We have decided to use the term *anthropomorphism*, rather than other possibilities such as *mental state attribution* or *subjective analogical inference* (Burghardt, 1985a), because we see it as pointing toward human cognition in much the same way that mental state attribution points toward other entities and away from humans.

2. Arguably, Humphrey (1976, 1986) may be partially responsible for this retreat. His 1976 paper, also proposes that human had "remarkable powers of social foresight and understanding" for calculating the consequences of their own behavior, the behavior of others, and the consequent gains and losses.

Notably, his paradigmatic example of social interaction is chess, a zero-sum game. If humans have remarkable powers for calculating the costs and benefits of their own and others' behavior (and the research evidence suggests they do not, as we indicate later), we would expect them to be able to detect that nature does not respond to human overtures.