

## *Anthropomorphism and Anthropodenial: Consistency in Our Thinking about Humans and Other Animals*

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*I am a firm believer that without speculation there is no good and original observation.*

—Darwin, 1857<sup>1</sup>

*If we feel ourselves emotionally affected by the behavior of an animal, it is a clear indication that we have intuitively discovered a similarity between its behavior and human behavior. We should not conceal this in our description.*

—K. Lorenz, *Here am I—Where Are You?* 1991, 260

*Fear of the dangers of anthropomorphism has caused ethologists to neglect many interesting phenomena, and it has become apparent that they could afford a little disciplined indulgence.*

—Hinde, *Ethology*, 1982, 76–78

## DOMAINS OF PARSIMONY

The ancient Greeks believed that the center of the universe was right where they lived. The *omphalos* of the world—a large stone in the shape of a beehive—can still be found among the temple ruins in the foothills of Mount Parnassos, near Delphi.

What better location to ponder humanity's position in the cosmos? In 1996, a group of philosophers, biologists, and psychologists gathered in Greece to debate concepts such as the Anthropic Principle, according to which the presence of human life explains why the universe is uniform in all of its directions. Next to this idea, the Greek illusion of being at the navel of the world looks rather innocent. The theme of our meeting, the problem of anthropomorphism,<sup>2</sup> relates very much to the self-absorbed attitude that has spawned such theories.

As I will argue, anthropomorphism and anthropocentrism are never far apart: the first is partly a "problem" due to the second. This is evident if one considers which characterizations of animals other than ourselves (from here on referred to as animals) tend to be criticized as anthropomorphic. To say that an animal follows its "instincts" is as much a matter of interpretation as to say that it acts "intentionally," yet it is only the second kind of description that gets one into trouble. Given that the absence of intentionality is as hard to prove as its presence, and given the lack of evidence that animals differ from people in this regard, such caution would be acceptable if human behavior were held to the same standard. But, of course, it is not.<sup>3</sup> Cries of anthropomorphism are heard particularly when a ray of light hits a species other than our own.

Derived from the Greek for "human form," anthropomorphism has enjoyed a negative reputation ever since Xenophanes, around 570 B.C., objected to Homer's poetry because it treated the gods as if they were people.<sup>4</sup> Why assume that gods look like us? Xenophanes mocked the arrogance behind this position, suggesting that if horses could draw pictures, they would no doubt make their gods look like horses. Hence the original meaning of anthropomorphism is that of misattribution of human qualities to nonhumans, or at least overestimation of the similarities between humans and nonhumans. Since nobody wants to be accused of any type of misattribution or overestimation, this makes it sound as if anthropomorphism is to be avoided under all circumstances.

But the question whether anthropomorphism is acceptable, or not, is inseparable from our relation with the animals. The study of animal behavior is among the oldest of human endeavors. As hunter-gatherers, our ancestors needed intimate knowledge of flora and fauna, including the habits of their prey as well as the animals that prey on humans. As pointed out by

Serpell,<sup>5</sup> the human-animal relationship must have been relatively egalitarian during this period. Hunters exercise little control: they need to anticipate the moves of their prey, and feel respect for their cunning if they escape. A more practical kind of knowledge became necessary when our ancestors took up agriculture and began to domesticate animals for food and muscle power. Animals became dependent on us and subservient to our will. The hunter's orientation to natural behavior, and the farmer's utilitarian and husbandry perspective, are still recognizable today in the two traditional scientific approaches to animal behavior: that of the zoologist and that of the psychologist.

The image of Konrad Lorenz being followed by a cohort of honking geese, or calling his tame raven out of the sky, is quite different from that of B. F. Skinner with his hand around the wings of a pigeon, placing the bird in a so-called Skinner box. The contrast is not merely in the personal relation with the subject of study, but also in the way behavioral information is being extracted. Observing animals under natural or naturalistic conditions, *ethologists* (behavioral zoologists) are interested in life cycles and species-typical behavior, such as how animals defend territories, court the opposite sex, evade predators, raise their young, communicate with one another, and so on. They try to meet the animal on its own terms, comparing behavioral characteristics along phylogenetic lines. As pointed out by Tinbergen,<sup>6</sup> the ethologist takes a distinctly functional and evolutionary perspective. Given the millions of species on earth, the grounds for comparison are inexhaustible.

*Behaviorists* (psychologists), on the other hand, often have little interest in the animal per se. They study animals to discover general laws of behavior and, ultimately, to understand ourselves. Their main focus is on the acquisition of stimulus-response contingencies, and the prediction and control of behavior. Thus, the comparative aspect of comparative psychology is essentially anthropocentric: extrapolations are generally from animals to humans along a linear progression from "lower" to "higher" forms.<sup>7</sup> Domesticated animals, such as white rats and pigeons, are raised in the laboratory as models for the "highest" form of life. These so-called phylogenetic scales have nothing to do with actual phylogeny, however, which is manifestly nonlinear.<sup>8</sup>

In both approaches, anthropomorphism is an issue of concern and debate, but only the behaviorists have erected a formal obstacle to it. This follows logically from their drive to explain behavior—animal as well as human—without "resorting" to mentalistic concepts. Although ethologists have occasionally fallen for the positivistic appeal of this position,<sup>9</sup> they never made it a formal component of their discipline. The behaviorist position is commonly traced to C. Lloyd Morgan,<sup>10</sup> who dampened the enthusiasm for

introspective and subjectivistic approaches to animal behavior by formulating his famous canon: “In no case may we interpret an action as the outcome of the exercise of a higher psychological faculty, if it can be interpreted as the outcome of the exercise of one which stands lower on the psychological scale.” This position, with its null hypothesis that mental operations in animals are relatively simple, will be referred to here as *cognitive parsimony*.<sup>11</sup>

All fundamental positions have their counterparts, however. Even though this is not universally acknowledged, the debate about anthropomorphism is essentially symmetrical (table 1). At the same time that anthropomorphism is rejected on the grounds that it tends to overestimate animal mental complexity, should not we be equally worried about the possible underestimation of similarities between humans and animals, and the possible underestimation of animal mental complexity? Alternatively, could it be that we routinely overestimate human mental complexity? The lack of terms to describe these particular sources of inaccuracy attests to the bias in the debate thus far. Whereas Lehman proposes to expand the meaning of “anthropomorphism” to cover this kind of error, I have coined the term *anthropodenial* for the a priori rejection of shared characteristics between humans and animals when in fact they may exist.<sup>12</sup> Anthropodenial is a blindness to the human-like characteristics of animals, or the animal-like characteristics of ourselves.

Anthropomorphism is generally considered a worse sin than anthropodenial mainly because the first tends to violate the principle of cognitive parsimony, whereas the second rarely does so. Yet, parsimony can be sought in various domains, and the cognitive domain is not inherently more important

TABLE 1  
PARSIMONY

Domain of Parsimony	Default Position	Inherent Risk	Concerns
Cognitive	The simplest possible cognitive explanation applies	False simplicity	Anthropomorphism
Evolutionary	Closely related species are cognitively similar	False similarity	Anthropodenial

Parsimony can be pursued in the cognitive as well as the evolutionary domain. If the search for parsimony in one domain conflicts with the search in another, we need to choose between acceptable risks. Critics of anthropomorphism warn against the overestimation of animal mental complexity, whereas critics of anthropodenial warn against the postulation of differences where none may exist.

than any other. As a biologist, I attach the greatest possible importance to economy in explanations of how and when differences arose in evolutionary time. The implications of this position, called *evolutionary parsimony*, are felt strongest when the comparison concerns humans and their closest relatives, the anthropoid apes. As summarized before:

By far the simplest assumption regarding the social behavior of the chimpanzee . . . is that if this species' behavior resembles that of ourselves then the underlying psychological and mental processes must be similar too. To propose otherwise requires that we assume the evolution of divergent processes for the production of similar behavior. While acceptable in connection with distantly related species, this assumption is never made when the comparison concerns nonhuman organisms with only a few million years of separate evolution. Historically, our own species has been considered an exception in this regard, yet arguments for this position have never been purely or even largely scientific.<sup>13</sup>

In other words, similarity between animal species requires a unitary explanation unless the species under consideration have been separated by enough evolutionary time to seriously consider evolutionary convergence. Thus, if wolves and coyotes share a large number of behavior patterns, the logical assumption is that these patterns are causally and functionally related. They probably derived from the common ancestor of both species.<sup>14</sup> The same cladistic rationale applied to humans and their close relatives should lead us to adopt cognitive similarity as the default position, thus making anthropomorphism a virtual nonissue. With the phylogenetic split between humans and chimpanzees assumed to have been a mere five to six million years ago, by far the greater risk would be anthropodenial.

This position is, of course, not entirely new. One of the first to advocate cross-specific uniformity in behavioral explanations was David Hume, who formulated the following touchstone in *A Treatise of Human Nature*:

'Tis from the resemblance of the external actions of animals to those we ourselves perform, that we judge their internal likewise to resemble ours; and the same principle of reasoning, carry'd one step farther, will make us conclude that since our internal actions resemble each other, the causes, from which they are deriv'd, must also be resembling. When any hypothesis, therefore, is advanc'd to explain a mental operation, which is common to men and beasts, we must apply the same hypothesis to both.<sup>15</sup>

It is important to add that, in contrast to the American behaviorists who two centuries later would accommodate animals and humans within a single framework by seriously downgrading human mental complexity and relegating consciousness to the domain of superstition,<sup>16</sup> Hume held animals

in high esteem: “No truth appears to me more evident than that beasts are endow’d with thought and reason as well as men.”<sup>17</sup>

## ANTHROPOCENTRIC ANTHROPOMORPHISM

Modern culture bombards us with humanizations of animals that confound serious debate about the role of anthropomorphism in science. Walt Disney made us forget that Mickey is a mouse and Donald a duck. Sesame Street, the Muppet Show, Barney: television is populated with talking and singing animal representations with little relation to their real counterparts. Popular depictions are often pedomorphic; that is, they follow ethology’s *Kindchenschema* by endowing animals with enlarged eyes and rounded infantile features designed to evoke endearment and protectiveness. Some believe that the entertainment industry’s massive “Bambification” of animals runs parallel to the modern animal rights movement.<sup>18</sup>

Then there is the satirical anthropomorphism based on the assumption that no one wishes to be compared with an animal. Some of the oldest cartoons depict public figures as animals, a pattern that I experienced firsthand when the 1987 French translation of my 1982 *Chimpanzee Politics* appeared. Unbeknownst to me, the publisher had put two major political rivals, François Mitterand and Jacques Chirac, on the cover with a grinning chimpanzee between them. The publisher no doubt wished to imply that these politicians act like apes, thus negating the whole point of the book, which was not to ridicule people but to show that chimpanzees live in complex societies, like ours, full of jockeying for power.<sup>19</sup>

One may also ask why zoo visitors are always joking about the primates, whereas the antelopes, lions, reptiles, and elephants fail to elicit hilarity. People stand in front of the monkey rock hooting and yelling, scratching themselves in an exaggerated manner, and pointing at the animals while shouting pleasantries like: “I had to look twice, Larry, I thought it was you!” More than other animals, primates place a question mark behind the dichotomy between the visitors and the visited. In my mind, the laughing reflects anthropodenial: it is a nervous reaction caused by an uncomfortable resemblance.<sup>20</sup>

The most common anthropomorphism, however, is the kind that naively attributes human feelings and thoughts to animals based on insufficient information or wishful thinking, such as when people exclaim “He must be the daddy!” when an adult male of any species gently plays with a youngster. We are the only animals, however, with the concept of paternity as a basis for fatherhood. Other animals can be fathers—and fathers may

treat juveniles differently than nonfathers—but never based on an explicit understanding of the link between sex and reproduction.

A published example of anthropomorphism from the human rather than the animal point of view is Marshall Thomas's suggestion, in *The Hidden Life of Dogs*, that virgin bitches "save" themselves for future "husbands," thus assuming a degree of foresight, not to mention puritan values, for which there is no indication in canine life.<sup>21</sup> I recall a newspaper interview with a woman who claimed that the squirrels in her backyard loved her to an extraordinary degree. The rodents visited her every day, came indoors, and accepted food directly from her hand. She spent over a thousand dollars per year on nuts. When the interviewer put the information together, discreetly suggesting that perhaps the abundant goodies explained the animals' fondness for her, the woman denied any connection.

Less naively done—but perhaps naively swallowed—is a recent advertisement for supposedly clean fossil fuel. The ad depicts a grizzly bear enjoying a pristine landscape with his arm draped around his mate's shoulders. In fact, bears are nearsighted and do not form pair bonds; the image is nothing but our own behavior projected onto these animals.

All such instances of anthropomorphism are profoundly anthropocentric. The talking animals on television, the satirical depiction of public figures, and the naive attribution of human qualities to animals are to a large extent independent of what we know about the animals themselves. In a tradition going back to the folktales, Aesop, and La Fontaine, this kind of anthropomorphism serves human social purposes: to mock, educate, moralize, and recreate. Most of it satisfies the picture, cherished by many, of the animal kingdom as a peaceable and cozy place.<sup>22</sup> The fact that animals kill and devour one another, die of starvation and disease, or are indifferent to one another does not fit the increasingly popular image of animals as noble savages. The general public is less and less aware of the discrepancies with the real world as fewer people grow up on farms or otherwise close to nature. Even though having a pet provides a reality check (dogs are generally nice, but not to their prey nor to invaders of their territory), the full picture of nature—its glory, its horror—escapes the modern city dweller.

In science, we try to move away from anthropocentric anthropomorphism. The goal is not to find some quality in an animal that is precisely equivalent to our own inner lives. Instead, the fact that we are animals is exploited to develop testable ideas (see Heuristic Anthropomorphism). Anthropocentric anthropomorphism does play a role in all of this, however, in that it serves to firmly plant the idea that we are animals. At an intuitive level, every child knows this, and we reinforce this knowledge with animal stories, fairy tales, animated movies, and so on. Thus, a bond is created with all living things, which bond is critically examined only later in life. As noted by Shepard:

The imaginary continuity between animals' lives and our own reinforces a profound and enduring metonymy, a lifelong shield against alienation. Especially at the end of puberty, the end of innocence, we begin a lifelong work of differentiating ourselves from them. But this grows from an earlier, unbreakable foundation of contiguity. Alternatively, a rigorous insistence of ourselves simply as different denies the shared underpinnings and destroys a deeper sense of cohesion that sustains our sanity and keeps our world from disintegrating. Anthropomorphism binds our continuity with the rest of the natural world. It generates our desire to identify with them and learn their natural history, even though it is motivated by a fantasy that they are no different from ourselves.<sup>23</sup>

In this last sentence, Shepard hints at a more mature anthropomorphism, in which the human perspective is replaced, however imperfectly, by the animal's. Looked at this way, one could argue that anthropodenial results from a differentiation between the self and the animal world so complete that the bond is disrupted, whereas animalcentric anthropomorphism reflects a differentiation in which the bond is preserved (fig. 1).

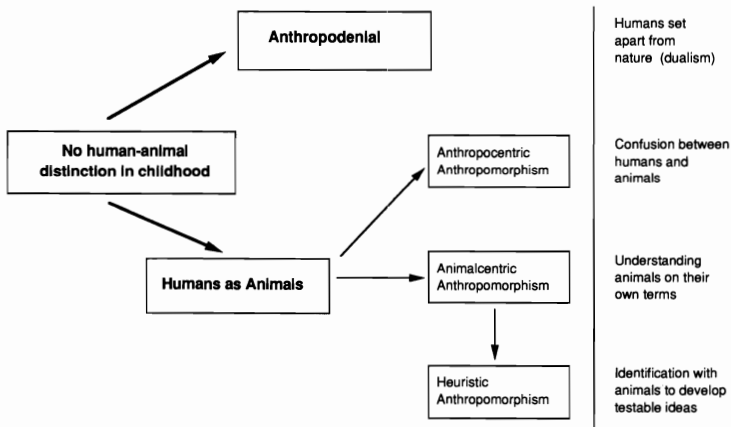


FIG. 1. Anatomy of anthropomorphism. Attitudes towards other animals develop from the child's lack of distinction to various degrees of differentiation. The most radical differentiation disrupts the human-animal bond to arrive at a denial of human-like characteristics in animals, i.e., anthropodenial. The lowest degree of differentiation, on the other hand, is reflected in a naive projection of human experiences onto other animals, i.e., anthropocentric anthropomorphism. A more mature form of differentiation is achieved through perspective-taking, where one realizes both how different and how similar another species is, and look at its behavior as much as possible from the animal's perspective, i.e., animalcentric anthropomorphism. The latter type allows scientists to develop testable ideas, i.e., heuristic anthropomorphism.



## ANIMALCENTRIC ANTHROPOMORPHISM

Whereas poets enjoy a proverbial “license” to transform reality, scientists lack such a license. Metaphors are used in science to great effect and advantage, but also at great peril. When metaphors are taken literally, they begin to obscure reality. This lot befell the well-known Struggle-for-Existence view of the natural world. It kept generations of biologists from seeing the profound conflux of interests among individuals and species even though Darwin himself—always wiser than his followers—warned: “I use the term Struggle for Existence in a large and metaphorical sense including dependence of one being on another.”<sup>24</sup>

In chemistry and physics, anthropomorphic metaphors are commonplace, such as when we say that elements are “attracted” to each other (not to mention that they “like” each other), or when we employ concepts such as “force” and “resistance.” In modern biology, our anthropomorphizing inclination is reflected in metaphors, such as the “selfish gene,” and the idea that organisms “adapt” to their environment. Unfortunately, in our minds metaphors tend to grow in significance until we forget that they are mere analogies. If our genes are selfish must not we be selfish, too? And if organisms adapt, does not this make adaptation a goal of life? In reality, genes lack a self, hence cannot be selfish, and adaptation is a passive process resulting from the elimination of maladaptive forms.

Anthropomorphic metaphors are attempts to make sense of the world around us: without reference to human experience, as Mary Midgley put it, there is no human understanding.<sup>25</sup> The urge to give nonhuman reality a human face starts early, when children project needs and desires on dolls and other inanimate objects. This urge is strong enough to be exploited for commercial purposes with objects, such as pet rocks, chia pets, and Tamagotchi, that do not even remotely resemble the usual recipients of love and care.<sup>26</sup> Care for imaginary pets and infants is not limited to our species: it has also been described for chimpanzees. Wrangham, an experienced field primatologist, observed a six-year-old juvenile, Kakama, carrying and cradling a small wooden log as if it were a newborn. Kakama did so for hours on end, one time even building a nest and putting the log into it on its own. Kakama’s mother was pregnant at the time. The investigator comments: “My intuition suggested a possibility that I was reluctant, as a professional skeptical scientist, to accept on the basis of a single observation: that I had just watched a young male chimpanzee invent and then play with a doll in possible anticipation of his mother giving birth.”<sup>27</sup>

In pretense play, two realities are held concurrently in mind: the log is both a newborn in need of care and a mere piece of wood to be abandoned when the game is over. Similarly, a kitten stalking and chasing a feather is

not going to eat it as it would prey. The distinction between the substitute and the real thing rests on a cognitive operation that may be crucial in relation to anthropomorphism. When grappling with complex realities, we adopt anthropomorphic labels because our mind most easily arranges the world in those terms. But we do not abandon all critical distance: we can call a dog “jealous” without necessarily assuming that the feelings involved are the same as when we are jealous.<sup>28</sup> We are perfectly capable of drawing parallels with our own experience without denying possible differences. Like the metaphor in science, anthropomorphism often pretend-plays with the idea of similitude. Unfortunately, this playful element of anthropomorphism is generally missed by its critics.

In a recent assault on the “delusions” of anthropomorphism in the behavioral sciences, Kennedy treats behaviorism and anthropomorphism as antithetical. In the preface to his book, the author confidently claims victory for the behaviorists: “Once a live issue, a butt for behaviourists, it [anthropomorphism] now gets little more than an occasional word of consensual disapproval (and exceptionally, a spirited defence).” In almost the same breath, however, Kennedy informs us that “anthropomorphic thinking about animal behaviour is built into us. We could not abandon it even if we wished to. Besides, we do not wish to.”<sup>29</sup> On the one hand, then, the author admits that anthropomorphism is part and parcel of the way the human mind works. On the other hand, he claims that we have all but won the battle against it. Did we really avoid the inevitable, or is this a behaviorist delusion?

In fact, the anthropomorphism of students of animal behavior is rarely a straightforward projection of human experience onto the animal. Rather than being anthropomorphic from a narrowly human perspective, ethologists mostly interpret behavior within the wider context of species’ habits and natural history. They thus avoid uninformed interpretations, such as that a grinning rhesus monkey must be delighted, or that a chimpanzee running toward another with loud grunts must be in an aggressive mood. Anyone who has watched these animals for the amount of time that primatologists typically devote to their work knows that rhesus monkeys bare their teeth when intimidated, and that chimpanzees often grunt when they meet and embrace. In other words, a grinning rhesus monkey signals submission, and grunting by a chimpanzee usually serves as a greeting. Hence, the careful observer may arrive at insights that are at odds with extrapolations from human behavior.

When Sofie, a six-month-old kitten, bounces toward me sideways, with wide eyes, arched back, and fluffy tail, I recognize this as playful bluff. This judgment is not based on me knowing any people who act this way. I just know how Sofie’s behavior fits with all the other things cats do. Or, when an animal caretaker says “yummy” while feeding mealworms to a squirrel

monkey, she is speaking for the animal, not for herself. Such animalcentric anthropomorphism must be sharply distinguished from anthropocentric anthropomorphism.<sup>30</sup>

Not all animals lend themselves equally to the animalcentric approach, however. How to identify with an animal such as, say, the star-nosed mole, with twenty-two pink, writhing tentacles around its nostrils? Able to feel microscopic textures on small objects in the mud, this mole must have the keenest sense of touch of any animal on earth. The problem of sharing the experiences of organisms that rely on different senses was expressed most famously in Nagel's question "What is it like to be a bat?"<sup>31</sup> A bat perceives its world in pulses of reflected sound, something most of us, creatures of vision, have a hard time imagining. Nagel's answer to his own question—that we will never know—may have been overly pessimistic. Some blind persons manage to avoid collisions with objects by means of a crude form of echolocation.<sup>32</sup>

Similarly, Sacks describes a medical student on amphetamine highs who went through a period of several weeks in which his world became incredibly rich in smells. He said he could smell human emotions (fear, contentment, sexuality), and recognize every street, every shop by smell. He could olfactorily distinguish people: "I went into the clinic, I sniffed like a dog, and in that sniff recognized, before seeing them, the twenty patients who were there. Each had his own olfactory physiognomy, a smell-face, far more vivid and evocative, more redolent, than any sight face."<sup>33</sup> Of course, this young man did not suddenly develop a better nose: the changed perception was due to the disinhibition of a sense that is normally pushed to the background by other senses. In the same work, Sacks also describes a patient who entirely lost his smell in order to make the point that a sense to which we rarely give a second thought is extremely important in "coloring" everything around us.

We orient ourselves in the environment through sensory input that much of the time fails to enter our consciousness. We may be aware of some visual and auditory stimuli, but most stimuli affect us without our knowing. We realize their importance only when they either fully disappear or are selectively intensified. We do, to some degree, share the worlds of bats and dogs, but mostly in the background of our sensory experience.

The goal to understand animals from the inside-out may be considered naive; it certainly is not anthropocentric. This goal, reflected in the title of Cheney and Seyfarth's *How Monkeys See the World*, may be fairly widespread among ethologists.<sup>34</sup> The mere projection of human experiences onto animals is obviously to be avoided in such an endeavor. Ideally, we understand animals based on what we know about their *Umwelt*—a German term introduced by von Uexküll for the environment as perceived by the animal.<sup>35</sup>

In the same way that parents learn to see through children's eyes, the empathic ethologist learns what is important to his or her animals, what frightens them, under which circumstances they feel at ease, and so on.

Numerous further illustrations of animalcentric anthropomorphism could be given, but let me end with one that recently reached the best-seller lists. In *The Man Who Listens to Horses*, Roberts freely employs what appears hopelessly anthropomorphic language to describe his animals' reactions. When the horses make licking and chewing movements, for example, they are said to be negotiating with their trainer: "I am a herbivore; I am a grazer, and I'm making this eating action with my mouth now because I'm considering whether or not to trust you. Help me out with that decision, can you, please?"<sup>36</sup> Rather than attributing human tendencies to his animals, however, Roberts's interpretations are from the animal's perspective. His extraordinary success as trainer rests on the fact that he treats the horse as a flight animal in need of trusting relations. A horse has a fear-based psychology totally different from that of a predator. "The horse, then, sits at the far end of the flight animal spectrum, while humankind, the supreme fight animal, is his clear opposite."<sup>37</sup>

Is it really anthropomorphic to look at the world from the animal's viewpoint, taking its *Umwelt*, intelligence, and natural tendencies into account? If the definition of anthropomorphism is, as Asquith says, "the ascription of human mental experiences to animals,"<sup>38</sup> Roberts is, strictly speaking, not anthropomorphizing: he explicitly postulates major differences in the psychological makeup of horses and people. Whereas he does put human words in the horse's mouth, this seems done for the sake of communication with his readers, not because of any confusion between the two species.

TABLE 2

ANTHROPOMORPHISM CAN BE APPLIED TO ANIMAL BEHAVIOR FROM TWO CONTRASTING PERSPECTIVES

Perspective	Informed by	Anthropomorphic
Anthropocentric	Human introspection: "How would I think/feel in this situation?"	Content and language
Animalcentric	The animal's sensory <i>Umwelt</i> and species-typical behavior: "What is it like to be a bat?"	Language

## HEURISTIC ANTHROPOMORPHISM

Ethologists favor descriptive labels for their so-called “ethograms” in which they summarize species-typical behavior. This way, they do not need to commit themselves to a functional interpretation before starting the actual data collection. They thus keep their hands free, so to speak, to interpret the behavior in multiple ways. In addition, many animal species share similar behavior patterns but with a slightly changed meaning. An interpretation that worked for the display in one species may not work for the homologous display in another, especially if the species are only distantly related.<sup>39</sup>

A good example is the facial display in which primates bare their teeth and gums through lip-retraction. This expression is sometimes described as the “fear grimace” or “fear grin.” There is indeed a strong fear component (expressed in flight tendency) detectable in most Old World monkeys, but even in these species the display is considered to possess appeasing qualities, and flight responses are by no means always observable.<sup>40</sup> In great apes, such as chimpanzees and bonobos, it is not unusual for the display to occur in friendly and sexual contexts, during approach rather than withdrawal, and in high-ranking individuals who have little to fear.<sup>41</sup> In humans, finally, the display evolved into the smile, with its largely affectionate meaning.<sup>42</sup> For the same reason that we would not want to call the human smile a “fear grimace,” we do not want to call the homologous expression in the rhesus monkey a “smile.” The chimpanzee’s expression falls somewhere in-between, and the bonobo’s seems closer to ours. Obviously, a neutral label such as “bared-teeth face” facilitates a discussion of the evolution of this facial display.

Adoption of descriptive labels and clear-cut definitions for the purpose of data collection ensures research replicability. The higher the level of analysis, however, the more difficult a purely descriptive attitude is maintained. Here, we organize streams of behavior according to social meaning (e.g., “friendly,” “aggressive”), interaction type (e.g., “A supports B”), and long-term relationships (e.g., “allies,” “rivals”). Because information is organized with the help of theory and judgment, there is no reason to pretend, in the language selected, that it is a mere extension of our descriptive activity. Some systematizing takes place already at the level of perception, which is the reason that the human observer cannot be replaced by an imaginary apparatus designed to objectively record postures and muscle movements. The human observer is highly selective and sensitive to both the context and *Gestalt* of behavior, whereas the apparatus would just record a ridiculous amount of detail. Its output would make no sense. As one of my teachers, Gerard Bearends, once warned: under the microscope, an elephant and a hippopotamus look alike.

A common behavioral category that would escape the mechanical observer is play. Play is recognized in a wide variety of species despite the virtual impossibility of pinpointing its distinguishing features.<sup>43</sup> It resembles fighting, includes energetic locomotion, and sometimes has sexual elements. Yet, it is quite distinct in meaning and consequence from serious fighting, mere locomotion, or sex. Could it be that, when identifying play as play, we rely in part on our sensitivity to intent, and on our ability to empathize with the element of “fun” that is said to defy both definition and logical analysis?<sup>44</sup> Adopting a descriptive term, such as “rearranged elements drawn from other types of behavior” (part of a definition by Marler and Hamilton)<sup>45</sup> does not help. The problem would then be to decide which rearrangements of behavior to include, and which to exclude. But remember, the central issue is not the concreteness of our definitions, or even the role of subjective judgement, but the replicability of behavioral codification. Since competent observers are known to reliably make extremely complex judgements, Bakeman and Gottman consider it a fallacy to equate objectivity with physically based observation schemes.<sup>46</sup>

Words convey the structure that we impose upon the world. Insofar as the structuring is done secondarily, after data has been collected with the aid of a well-defined ethogram, this form of anthropomorphism does not burden the observer with impossible judgment calls. For example, “reconciliation” is a label introduced by de Waal and van Roosmalen for affiliative body contact between individuals not long after an aggressive conflict in which they opposed one another.<sup>47</sup> The label’s emotional and cognitive connotations do not preclude a straightforward behavioral definition. As Cords observes about research on this topic since its discovery: “All determinations of the frequency of reconciliation have in fact been made using an operational definition of this behavior, despite the function implied by its name.”<sup>48</sup>

The best way to look at this kind of labels is as heuristic devices that reorient our views and provide new frameworks for research. Burghardt explains their purpose:

What I am calling for is a critical anthropomorphism, and predictive inference that encourages the use of data from many sources (prior experiments, anecdotes, publications, one’s thoughts and feelings, neuroscience, imagining being the animal, naturalistic observations . . . etc.). But however eclectic in origin, the product must be an inference that can be tested or, failing that, can lead to predictions supportable by public data.<sup>49</sup>

The other side to this heuristic coin is, of course, that interpretative labels are only as good as the hypotheses that they generate. We should be prepared to discard labels whenever predictions derived from them are con-

tradicted. Thus far, this has not been the case with the “reconciliation” label. Let me briefly review the evidence, which also serves to illustrate how a heuristic concept can be tested from different angles.

The first aim of reconciliation research has been to compare two alternative expectations concerning the effect of aggression on social relations. The traditional notion, that aggression serves a spacing function, was based on the experience of early ethologists with territorial species, and on Hediger’s concept of individual distance.<sup>50</sup> It predicts decreased contact between individuals following aggressive conflict. The reconciliation hypothesis, on the other hand, predicts the exact opposite, namely that individuals try to undo the damage inflicted by aggression on social relationships. Here we expect (a) increased contact following aggression, and (b) the use of special reassuring and appeasing gestures during these contacts.

The reconciliation concept is supported, therefore, if individuals contact each other more frequently and with more calming gestures after aggression than in the absence of preceding aggression. Studies on over twenty different species of nonhuman primates support this prediction.<sup>51</sup> In addition, the reconciliation hypothesis is supported by the fact that the observed contact-increase is selective (i.e., does not indiscriminately involve all possible partners but specifically the former opponent), and the probability of renewed aggression is reduced and tolerance is restored following post-conflict contact.<sup>52</sup>

Strictly speaking, these results still do not demonstrate the specific function suggested by the “reconciliation” label, which is to repair damaged relationships. Other evidence exists, however. Even though primate species vary dramatically in conciliatory behavior and general conciliatory tendency, all species seem to follow one rule: reconciliation is most common after fights between partners with close social ties.<sup>53</sup> This is consistent with the idea that reconciliation aims at restoring relationships. Experimental support has been produced by Cords and Thurnheer,<sup>54</sup> who trained monkeys to cooperate during feeding. This way, the experimenters increased the value of the monkeys’ relationships. They confirmed a dramatic increase in reconciliation after conflict between partners that had come to depend on each other for food-acquisition.<sup>55</sup>

In sum, even though the reconciliation concept’s connotations derive from human social interaction, the concept has prompted a fresh look at animal aggression and conflict resolution by generating new and testable hypotheses. The ensuing research has undermined the traditional view in biology that intraspecific aggression is constrained by injury risks only.<sup>56</sup> Social animals seem to take social relationships into account, which is understandable inasmuch as their survival depends on cooperation and group life.<sup>57</sup>

The reconciliation concept illustrates how anthropomorphism may serve scientific exploration, similar to the way in which intuition and informed “hunches” function in all of science, from mathematics to paleontology. I will speak of *heuristic anthropomorphism* to denote this scientific use. Even though heuristic anthropomorphism may occasionally be anthropocentric, most of the time it will be animalcentric (fig. 1). The category is identical to Burghardt’s “critical anthropomorphism,”<sup>58</sup> and related to Kennedy’s “mock anthropomorphism”:

In fact all students of whole animal behaviour regularly practise such ‘mock anthropomorphism,’ by imagining what an animal is ‘trying’ to do, or guessing what it will do on the basis of what we would think it best for it to do. In this way we can guess the function of its behaviour. That is to say we habitually anthropomorphize about animal behaviour, using our own mental processes as models to ‘explain’ the behaviour in terms of intentions; and again, this is very useful.<sup>59</sup>

The critical unasked question here is: Why is anthropomorphism so useful, and why does it predict behavior so well? If the modeling of animal behavior on our own experiences is more successful than predictions based on existing formal theories,<sup>60</sup> does not this imply that the anthropomorphic modeling touches on organizational principles that are absent from current theories? As noted long ago by Hebb: “The objective categorization missed something in the behavior of the chimpanzee that the ill-defined categories of emotion and the like did not—some order, or relationship between isolated acts that is essential to comprehension of the behavior.”<sup>61</sup>

Kennedy warns, however, that even if hypotheses derived from this kind of anthropomorphism are well-supported by research this by no means proves that the assumed intentions or motivations really exist in the animal.<sup>62</sup> In the same way, computer programmers debate the usefulness of anthropomorphism in human-machine interactions not because machines share our experiences, but because we find it easier to deal with machines in human terms. We develop anthropomorphic hypotheses about them, such as “my computer is confused” or “it refuses to do these things.” This is indeed, to use Kennedy’s words, mock anthropomorphism: we realize that it is merely a matter of speaking.

But is not the situation with regards to animals quite different, especially with regards to animals close enough to us that we recognize emotions in their faces and intentions in their actions? If a chimpanzee, who sits huddled in a corner after having lost her infant, is said to look depressed, this is not just a matter of speaking, a spurious anthropomorphism, unless one is convinced that apes, like machines, lack an emotional life. Animals are made of flesh and blood, have limbic systems, and share thousands upon thousands of features with us that are absent in computers and robots. As



soon as we admit that animals are *not* automatons, anthropomorphism carries the implication that the postulated similarities are more than skin-deep.

## WHERE TO DRAW THE LINE?

On August 16, 1996, an ape saved a three-year-old boy. The child, who had fallen six meters into the primate exhibit at Chicago's Brookfield Zoo, was scooped up and carried to safety by Binti Jua, an eight-year-old female western lowland gorilla. The gorilla sat down on a log in a stream, cradling the boy in her lap, giving him a brief back-pat before she continued on her way. Binti became a celebrity overnight, figuring in the speeches of leading politicians who held her up as an example of much-needed compassion.

Some scientists cautioned, however, that Binti's motives might have been less noble than appeared, pointing out that this gorilla had been raised by people, had been taught parental skills with a stuffed animal, and that the whole affair might have been one of a confused maternal instinct. Other speculations included that Binti might have been trained to fetch objects, that she might have acted the same with a sack of flour, or that she presented the child to the keepers with the same pride with which a housecat presents a dead mouse to the homeowner.<sup>63</sup>

The intriguing thing about this flurry of alternative explanations was that nobody would think of raising similar issues when a person saves a dog hit by a car. The rescuer might have grown up around a kennel, have been praised for being kind to animals, yet we would still see his behavior as an act of caring. Why then, in Binti's case, was her background held against her? Clearly, no one had prepared her for this kind of emergency. It seems unlikely that she, with her own seventeen-month-old infant on her back, could have mistaken a blond boy in sneakers and a red t-shirt for a juvenile of her own species. Actually, the biggest surprise was how surprised most people were. Students of ape behavior did not feel that Binti had done anything unusual. Jörg Hess, a Swiss gorilla expert, put it most bluntly in an interview with Schuster: "The incident can be sensational only for people who don't know a thing about gorillas."

Binti's actions made a deep impression mainly because they benefited a member of our own species. In my work on the evolution of morality and empathy, I have encountered numerous instances of animals caring for one another. For example, zoo bonobos have been known to assist companions new to their quarters, taking them by the hand so as to guide them through the maze of corridors connecting parts of their building. For chimpanzees we even have systematic data demonstrating that they console victims of attack, placing an arm around their shoulder or patting their backs. The

evidence, reviewed by de Waal and de Waal and Aureli, is in line with Binti's assistance to the unfortunate boy. In other words, we are not dealing with an isolated incident, but have convergent evidence which makes sympathy in apes a serious possibility.<sup>64</sup>

An entire range of explanations presents itself. Our first task is to eliminate the ones that are either too simple or too complex. For example, the above flour-sack explanation fails to tell us why Binti so carefully transported the boy only to leave him near the keeper's door.<sup>65</sup> On the other hand, we cannot assume that Binti had an understanding of what kind of care the boy required. Once we have determined the cognitively least-demanding explanation that cannot be rejected as well as the cognitively most-demanding explanation consistent with our general knowledge of the species, we find between these extremes a "workspace" within which hypotheses can be compared. This comparison cannot be conclusively made on the basis of a single incident, but there certainly is no a priori reason to restrict the workspace to a few simple explanations (fig. 2).

Exploration of the full workspace is often discouraged by charges of anthropomorphism. This represents a misuse of the term: warnings against overestimation of animal capacities are understandable, but whether or not explanations are phrased in anthropomorphic language is immaterial. All that matters is that we know what is meant and how these explanations may be verified. Originally, the term anthropomorphism referred to endowing the gods with human forms and habits, which does represent a misdemeanor. There has never been a compelling justification, however, for retention of the term's negative connotation once it was adopted for a different domain. The geneticist Darbishire saw this lack of justification as an underhanded maneuver by the powers opposing a cognitive perspective:

But those who were responsible . . . for applying the word anthropomorphic to an entirely different thing—the granting of intelligence, purpose, design, and human attributes to nonhuman animals, in order to stigmatize a concession to the 'lower animals' which was repugnant to them—were the unconscious perpetrators of a successful fraud.<sup>66</sup>

Thus, while we should be reluctant to postulate capacities for which there is no evidence anywhere in a species' behavior, charges of anthropomorphism are meaningless without a precise critique of the hypotheses under consideration. In a Darwinian framework, there is no good reason to avoid concepts merely because they derive from the behavior of the species to which we belong. Application of these concepts to animals not only enriches the range of hypotheses to be considered, but it also changes the view of ourselves: the more human-like we permit animals to become the more animal-like we become in the process. A permissive treatment of

anthropomorphism will hasten the demise of dualism, and—as argued throughout this paper—ultimately it is the attitude toward dualism between humans and animals, rather than a concern with scientific validity, that underlies the debate about anthropomorphism.

## CONCLUSION

Anthropomorphism comes in many shapes and forms. It ranges from the naive projection of human experience onto other species to serious attempts to understand animals on their own terms through intimate familiarity with their behavior and *Umwelt*. Some forms of anthropomorphism fail to provide

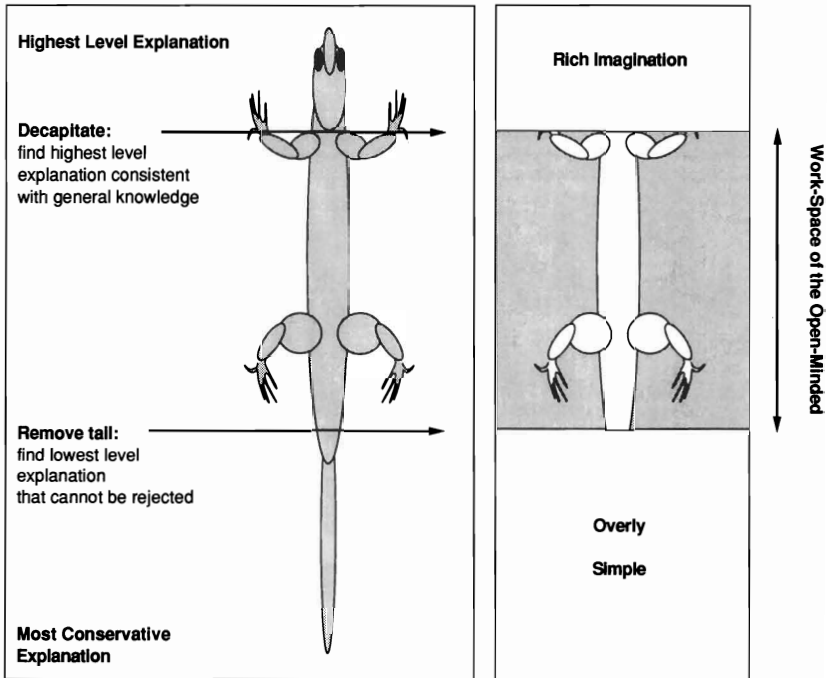


FIG. 2. The lizard model of explorable workspace. From the entire range of imaginable explanations for a certain behavior (the full length of the lizard), we first eliminate explanations that are either overly simple or overly demanding given our general knowledge of the species. Second, we compare explanations within the remaining workspace: the quest being for the best, not the simplest explanation. The model shows a lizard, because in the same way that these animals can regenerate their tails, one needs to remain alert for novel low-level alternative explanations

useful information or generate useful hypotheses, but the fact that we are animals ourselves also provides us with an immense advantage. The full exploitation of this advantage requires a tolerant attitude toward the borrowing of human concepts to explain animal behavior. After all, with respect to species close to us the most parsimonious explanation, from an evolutionary perspective, is that they share numerous emotional and cognitive processes with us. Thus, anthropomorphism ought to be a nonissue in the case of anthropoid apes. But even in the case of more distant species, anthropomorphic explanations deserve serious attention. We should never accept explanations without critical reflection, but there is nothing wrong with widening the workspace of permissible hypotheses while retaining high standards of replicability and scientific scrutiny.

## NOTES

I am grateful to Gerald Massey for stimulating me to put my thoughts on paper, introducing me to David Hume's *Treatise*, and directing me to literature on special human perceptual abilities, such as found in the writings of Sacks and Vermeij. Preparation of this paper was supported by grant RR-00165 from the National Institutes of Health to the Yerkes Regional Primate Research Center.

1. Quoted in P. Brent, *Charles Darwin: A Man of Enlarged Curiosity* (New York: Harper & Row, 1981), 409.
2. "The Problem of Anthropomorphism in Science and Philosophy" was the title of a meeting of the Athens-Pittsburgh Symposium in the History and Philosophy of Science and Technology, held in May 1996, in Delphi, Greece.
3. G. G. Gallup and S. D. Suarez, "Overcoming Our Resistance to Animal Research: Man in Comparative Perspective," in *Comparing Behavior: Studying Man Studying Animals*, ed. D. Rajecki (Hillsdale, N.J.: Erlbaum, 1983), 5–26; G. F. Michel, "Human Psychology and the Minds of Other Animals," in *Cognitive Ethology: The Minds of Other Animals*, ed. C. Ristau (Hillsdale, N.J.: Erlbaum, 1991), 253–72.
4. See, for example, E. Cenami Spada, "Amorphism, Mechanomorphism, and Anthropomorphism," in *Anthropomorphism, Anecdotes, and Animals*, ed. R. W. Mitchell, N. S. Thompson, and H. L. Miles (Albany, N.Y.: SUNY Press, 1997), 37–49.
5. J. Serpell, *In the Company of Animals: A Study of Human-Animal Relationships* (Cambridge: Cambridge University Press, 1996).
6. N. Tinbergen, "On the Aims and Methods of Ethology," *Zeitschrift für Tierpsychologie* 20 (1963): 410–33.
7. J. E. R. Staddon, "Animal Psychology: The Tyranny of Anthropocentrism," *Perspectives in Ethology* 8 (1989): 123–36.
8. W. Hodos and C. B. Campbell, "Scala Naturae: Why There Is No Theory in Comparative Psychology," *Psychological Review* 76 (1969): 337–50. For the sake of argument, I am contrasting the two perspectives on animal behavior—ethology and comparative psychology—to a greater degree than necessary. These approaches have grown considerably closer since Hinde's synthesis. See R. A. Hinde, *Animal Behaviour: A Synthesis of Ethology and Comparative Psychology* (New York: McGraw-Hill, 1966). Nevertheless, it remains true that social scientists, including psychologists and anthropologists, are trained to look at animals as a means to the end of understanding human behavior,

whereas in biology the understanding of humans is part of a much larger endeavor to understand nature.

9. See, for example, H. Kummer, V. Dasser, and P. Hoyningen-Huene, "Exploring Primate Social Cognition: Some Critical Remarks," *Behaviour* 112 (1990): 84–98. At the 1989 International Ethological Conference, Hans Kummer advocated parsimony in the explanation of primate behavior in order to get away from "our anthropomorphic first choice" of overly demanding cognitive hypotheses. He criticized the use of functional as opposed to descriptive labels for behavior (*ibid.*). In a reply (F. B. M. de Waal, "Complementary Methods and Convergent Evidence in the Study of Primate Social Cognition," *Behaviour* 118 [1991]: 297–320), I reminded ethologists that one of the more powerful metaphors in our field came from a hard-nosed experimentalist who referred to a special form of insect locomotion as *Tanzsprache*, or dance language (K. von Frisch, *Tanzsprache und Orientierung der Bienen* [Heidelberg: Springer, 1965]). Contrary to the suggestion that functional language is a recent vice, it has a venerable history. Functional terms such as "appeasement," "warning call," "greeting," "courtship," and so on, differ from more recent functional labels only by our greater familiarity with them. See P. J. Asquith, "The Inevitability and Utility of Anthropomorphism in Description of Primate Behaviour," in *The Meaning of Primate Signals*, ed. R. Harré and V. Reynolds (Cambridge: Cambridge University Press, 1984), 138–76.

Kummer and his students have been no exception, introducing useful non-descriptive labels, such as "notification" for a baboon's presentation of his hindquarters, and "respect of possession" for the absence of contest over a resource possessed by a subordinate (H. Kummer, *Social Organization of Hamadryas Baboons* [Chicago: University of Chicago Press, 1968]; H. Sigg and J. Falett, "Experiments on Respect of Possession in Hamadryas Baboons (*Papio hamadryas*)," *Animal Behaviour* 33 [1985]: 978–84). Harré analyzed a sample of Kummer's writing to demonstrate ambiguity between the respectable language of causal mechanisms (terms such as "inhibit," "release," and "elicit") and cognitive language (terms such as "decide," "assess," and "unwilling") (R. Harré, "Vocabularies and Theories," in *The Meaning of Primate Signals*, ed. Harré and Reynolds, 90–106). At the time, Kummer responded to this challenge with the plea that "everyday language must remain available for what has yet escaped satisfactory explanation" (H. Kummer, Comment, in *The Meaning of Primate Signals*, ed. Harré and Reynolds, 107).

10. C. L. Morgan, *An Introduction to Comparative Psychology* (London: Scott, 1894).
11. This conventional interpretation of Morgan's canon is probably incorrect. Taken aback by one-sided appeals to his canon, Morgan later added a little-known rider: "To this, however, it should be added, lest the range of the principle be misunderstood, that the canon by no means excludes the interpretation of a particular activity in terms of the higher processes if we already have independent evidence of the occurrences of these higher processes in the animal under observation" (C. L. Morgan, *An Introduction to Comparative Psychology*, 2d ed. [London: Scott, 1903], 59).

Sober takes this to mean that Morgan was less supportive of the behaviorist position than commonly assumed: "If methodological behaviorism is the view that human behavior should be explained without appealing to inner mental states, even though we know that human beings in fact occupy such states, then the rider that Morgan appended entails that the canon cannot be used to justify methodological behaviorism" (E. Sober, "Morgan's Canon," in *The Evolution of Mind*, ed. and D. D. Cummins and C. Allen [Oxford: Oxford University Press, 1998], 224–42; quotation on 240). Sober further argues that Morgan did not see "lower" capacities as necessarily providing simple explanations, the simplest view being continuity and similarity between animals and humans. Cognitive parsimony did not seem his principal aim, therefore, and he showed sensitivity to the danger of anthropodenial.

The great flaw in Morgan's approach remains his linear, hierarchical view of the relations among species and their capacities rather than the cladistic perspective of modern biology. Nevertheless, his rider encourages us to consider a wide array of hypotheses in

case of the mentally more advanced species as discussed by G. M. Burghardt, "Animal Awareness: Current Perceptions and Historical Perspective," *American Psychologist* 40 (1985): 905–19; D. Radner and M. Radner, *Animal Consciousness* (Buffalo, N.Y.: Prometheus, 1989); and de Waal, "Complementary Methods."

12. H. Lehman, "Anthropomorphism and Scientific Evidence for Animal Mental States," in *Anthropomorphism, Anecdotes, and Animals*, ed. Mitchell, Thompson, and Miles, 104–15; F. B. M. de Waal, "Are We in Anthropodenial?" *Discover* 18 (7) (1997): 50–53.
13. De Waal, "Complementary Methods," 298.
14. In biology, this is known as the homology argument. Cross-specific similarities in behavior are either *analogies* (independently derived) or *homologies* (derived through shared phylogeny). Of course, a third possibility is that behavioral similarities are independently learned (rather than being genetically determined). The default assumption used to be that similarities between disparate animal orders represent mere analogies, but this assumption needs to be reconsidered given what we know now about the genetics of anatomical features. There exists growing evidence that widespread anatomical traits in the animal kingdom, such as legs and eyes, share the same genetic basis despite major structural differences, such as the composite insect eye versus the single-pupil eye of mollusks and vertebrates. Apparently, the genetic unity among animals is much greater than used to be assumed, and homology may be the rule rather than the exception.
15. D. Hume, *A Treatise of Human Nature* (1739; reprint, Harmondsworth, Eng.: Penguin, 1985), 226.
16. See, for example, J. B. Watson, *Behaviorism* (Chicago: University of Chicago Press, 1930).
17. Hume, *Treatise of Human Nature*, 226. Strictly speaking, one cannot boast a unified theory of all behavior, human and animal, while at the same time decrying anthropomorphism. After all, anthropomorphism assumes similar experiences in humans and animals, which is exactly what one would expect if the underlying behavioral processes are similar. The behaviorists' strong opposition to anthropomorphism probably came about because no sane person would take seriously their claim that internal mental operations in *our* species are a figment of the imagination. This left animal behavior as the only area in which protest against cognitive assumptions remained effective. If true, the behaviorists' focus on anthropomorphism represents a retreat from an earlier, more radical position.
18. S. J. Vicchio, "From Aristotle to Descartes: Making Animals Anthropomorphic," in *Animal Intelligence: Insights into the Animal Mind*, ed. R. J. Hoage and L. Goldman (Washington, D.C.: Smithsonian Institution Press, 1986), 187–207.
19. *Chimpanzee Politics* was one of the first accounts of primate behavior refusing to make excuses for anthropomorphism, saying: "These terms reflect my subjective impressions of the apes. It is anthropomorphism in its purest form" (F. B. M. de Waal, *Chimpanzee Politics* [Baltimore, Md.: Johns Hopkins University Press, 1982], 54).
20. This attitude was exploited for decades in the so-called "tea parties" at zoos, in which apes were dressed up in human clothes and shown sitting around a table, smoking cigars, and sipping from cups. Nationally famous representatives of this genre were Jo Mendi, a chimpanzee, who performed in the 1930s at the Detroit Zoo, and Petermann, a chimpanzee in the 1980s at the Cologne Zoo. Both apes had huge followings. Jo Mendi once drew a crowd twice as large as the presidential candidate (Franklin D. Roosevelt) visiting the city, an issue exploited by FDR's opponents. Petermann was shot by the police after he severely mauled the zoo director, an event that temporarily turned him into a martyr for the anarchist movement.

Undignified circuslike acts have now disappeared from major zoos. Concurrently, public reactions have changed from amusement about the "antics" of apes to a more empathic response. This shift in attitude is also reflected in modern ethics movements (e.g., P. Cavalieri and P. Singer, *The Great Ape Project: Equality Beyond Humanity* [London: Fourth Estate, 1993]) and popular works of fiction (e.g., P. Høeg, *The Woman and the Ape* [Harmondsworth, Eng.: Penguin, 1996]; R. Cook, *Chromosome 6* [New York: Putnam, 1997]).

21. Marshall Thomas, *The Hidden Life of Dogs* (Boston: Houghton Mifflin), 6, 56.
22. A typical example is the animated movie, *The Lion King*: "The characters . . . exhibit behaviors that are uncharacteristic of the animals they portray. The interspecific relationships in the film alone justify the conclusion that realistic interactions between animals are not taking place. From the script of the film, transcribed by Brian Tiemann, the character Timon, a meerkat, admits as much when he says, 'We're talking about a lion. Lions eat guys like us.' In spite of the obvious truth of this statement, the lion protagonist, Simba, develops a rather unnatural symbiotic friendship with Timon and his warthog companion, Pumbaa. Later in the film, as depicted in Tiemann's script, we see Timon, Pumbaa and Simba, lying on their backs, looking at the stars. It would appear that Simba has somehow forgotten that he is a lion" (S. Keyworth, Anthropomorphism in *The Lion King*, [www.gate.net/~bneufeld/lionking.html](http://www.gate.net/~bneufeld/lionking.html) [1996]).
23. P. Shepard, *The Others: How Animals Made Us Human* (Washington, D.C.: Shearwater, 1996), 88.
24. C. Darwin, *On the Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life* (1859; reprint, London: John Murray, 1967), 62.
25. M. Midgley, *Beast and Man: The Roots of Human Nature* (Hassocks, Sussex: Harvester, 1978).
26. In the 1975 Christmas season, millions of Americans spent five dollars each to purchase ordinary rocks as pets. The rocks were sold in boxes with air holes and came with a manual explaining how to train the rock to roll over, to play dead, and to protect its owner. Tamagotchi is a popular Japanese electronic gadget that mimics a chick. It eats, sleeps, defecates, gets cranky, and beeps for attention. If the owner does not take care of it, Tamagotchi dies.
27. R. A. Wrangham and D. Peterson, *Demonic Males: Apes and the Origins of Human Violence* (Boston: Houghton Mifflin, 1996), 254. Playing with "dolls" is not unusual in nonhuman primates. In captivity, I have seen young chimpanzees act the same as Kakama with pieces of cloth, and once with a handbroom. A wild mountain gorilla was seen to pull up a mass of soft moss, which she carried and held for many minutes like an infant under her chest, cuddling and "nursing" it (R. W. Byrne, *The Thinking Ape: Evolutionary Origins of Intelligence* [Oxford: Oxford University Press, 1995]). A monkey example comes from Breuggeman, who saw a juvenile rhesus monkey follow her mother while she carried a newborn. The daughter picked up a piece of coconut shell, carrying it ventrally in exactly the same manner that her mother held her new brother. See J. A. Breuggeman, "Parental Care in a Group of Free-ranging Rhesus Monkeys (*Macaca mulatta*)," *Folia primatologica* 20 (1973): 178–210.
28. After a separation, elephants greet each other with much spinning around, urinating, earflapping, entwining of trunks, clicking of tusks, and a chorus of rumbles and piercing trumpets. Moss perceives this as a joyful event, but inserts the following qualification: "It may not be similar to human joy or even comparable, but it is elephantine joy and it plays a very important part in their whole social system" (C. Moss, *Elephant Memories: Thirteen Years in the Life of an Elephant Family* [New York: Fawcett Columbine, 1988], 125).
29. J. S. Kennedy, *The New Anthropomorphism* (Cambridge: Cambridge University Press, 1992), 5.
30. A distinction similar to the one proposed here between anthropocentric and animalcentric anthropomorphism is made in the field of human empathy. Batson et al. investigated response patterns associated with two kinds of empathy: one based on imagining how one would feel in the other person's situation, the other based on imagining how the other feels. See C. D. Batson, S. Early, and G. Salvarani, "Perspective Taking: Imagining How Another Feels versus Imagining How You Would Feel," *Personality and Social Psychology Bulletin* 23 (1990): 751–58.
31. T. Nagel, "What Is It Like to Be a Bat?" *Philosophical Review* 83 (1974): 435–50.

32. Vermeij, a blind biologist, writes: "If I had difficulty adjusting to blindness, the memory has faded. Almost immediately . . . I discovered the value of echoes for telling me where I was. Sounds bouncing off obstructions provided cues to the size of the room, the position of a tree, the speed of a car, the presence of a person, whether a door was open or closed, and much more. It wasn't that the remaining senses became more acute now that I was blind; I simply relied more on them. The information they conveyed now meant something, whereas previously I could afford to ignore it" (G. Vermeij, "The Touch of a Shell," *Discover* 17 [8] [1996]: 80). Further, see K. A. Atkins, "A Bat without Qualities?" in *Readings in Animal Cognition*, ed. M. Bekoff and D. Jamieson (Cambridge, Mass.: MIT Press, 1996), 345–58, for reflections on the limitations of Nagel's question.
33. O. Sacks, *The Man Who Mistook His Wife for a Hat* (London: Picador, 1985), 150.
34. D. L. Cheney and R. M. Seyfarth, *How Monkeys See the World: Inside the Mind of Another Species* (Chicago: University of Chicago Press, 1990); H. A. Herzog and S. Galvin, "Common Sense and the Mental Lives of Animals: An Empirical Approach," in *Anthropomorphism, Anecdotes, and Animals*, ed. Mitchell, Thompson, and Miles, 237–53.
35. J. von Uexküll, *Umwelt und Innenwelt der Tiere* (Berlin: Jena, 1909).
36. M. Roberts, *The Man Who Listens to Horses* (New York: Random House, 1997), 31. In fact, the idea that the horse's chewing movements refer to grazing is not far removed from the ethological concept of *ritualization*. Evolution has turned many an instrumental act (e.g., preening, feeding) into a communication signal through exaggeration and increased stereotypy. See D. McFarland, *The Oxford Companion to Animal Behaviour* (Oxford: Oxford University Press, 1987), 483–85.
37. Roberts, *The Man Who Listens to Horses*, 10.
38. Asquith, "The Inevitability and Utility," 138.
39. Note that this is the mirror image of the evolutionary parsimony argument made earlier. The more distant two species are in the phylogenetic tree, the less likely it is that morphologically similar behavior is causally and functionally equivalent.
40. S. A. Altmann, "A Field Study of the Sociobiology of Rhesus Monkeys," *Annals of the New York Academy of Sciences* 102 (1962): 338–435; J. A. R. A. M. van Hooff, "A Comparative Approach to the Phylogeny of Laughter and Smiling," in *Non-verbal Communication*, ed. R. Hinde (Cambridge: Cambridge University Press, 1972), 209–41; F. B. M. de Waal and L. M. Luttrell, "The Formal Hierarchy of Rhesus Macaques: An Investigation of the Bared-Teeth Display," *American Journal of Primatology* 9 (1985): 73–85.
41. F. B. M. de Waal, "The Communicative Repertoire of Captive Bonobos (*Pan paniscus*), Compared to That of Chimpanzees," *Behaviour* 106 (1988): 183–251.
42. Van Hooff, "A Comparative Approach."
43. R. Fagen, *Animal Play Behavior* (New York: Oxford University Press, 1981).
44. J. Huizinga, *Homo Ludens: A Study of the Play Element in Human Culture* (Boston: Beacon, 1950).
45. P. Marler and W. J. Hamilton, *Mechanisms of Animal Behavior* (New York: Wiley, 1966).
46. R. Bakeman and J. M. Gottman, *Observing Interaction: An Introduction to Sequential Analysis* (Cambridge: Cambridge University Press, 1986).
47. F. B. M. de Waal and A. van Roosmalen, "Reconciliation and Consolation among Chimpanzees," *Behavioral Ecology & Sociobiology* 5 (1979): 55–66.
48. M. Cords and S. Thurnheer, "Reconciliation with Valuable Partners by Long-tailed Macaques," *Ethology* 93 (1993): 256.
49. Burghardt, "Animal Awareness," 917.
50. H. Hediger, "Biologische Gesetzmäßigkeiten im Verhalten von Wirbeltieren," *Mitt. Naturforsch. Gesellschaft Bern* (1940): 37–55.
51. F. B. M. de Waal, "Reconciliation among Primates: A Review of Empirical Evidence and



- Unresolved Issues," in *Primate Social Conflict*, ed. W. A. Mason, and S. P. Mendoza (Albany, N.Y.: SUNY Press, 1993), 111–44.
52. F. Aureli and C. P. van Schaik, "Post-Conflict Behaviour in Long-tailed Macaques (*Macaca fascicularis*): I. The social events," *Ethology* 89 (1991): 89–100; M. Cords, "Post-Conflict Reunions and Reconciliation in Long-tailed Macaques," *Animal Behaviour* 44 (1992): 57–61.
  53. See, for example, P. M. Kappeler and C. P. van Schaik, "Methodological and Evolutionary Aspects of Reconciliation among Primates," *Ethology* 92 (1992): 51–69.
  54. Cords and Thurnheer, "Reconciliation with Valuable Partners."
  55. Silk questions whether reconciliation functions at the relationship level: she proposes that post-conflict reunions serve short-term functions only (J. B. Silk, "Why Do Primates Reconcile?" *Evolutionary Anthropology* 5 [1996]: 39–42). This hypothesis fails to account, however, for the elevated rates of reconciliation among individuals with close affiliative ties. It also fails to explain Cords and Thurnheer's experimental results that were predicted by the relationship-repair hypothesis (Cords and Thurnheer, "Reconciliation with Valuable Partners"). As noted by Cords and Aureli, short-term effects by no means exclude long-term effects, and Silk's hypothesis may not be a true alternative, therefore (M. Cords and F. Aureli, "Reasons for Reconciling," *Evolutionary Anthropology* 5 [1996]: 42–45).
  56. For the traditional view, see J. Maynard Smith and G. Price, "The Logic of Animal Conflict," *Nature* 246 (1973):15–18.
  57. F. B. M. de Waal, "Dominance Style and Primate Social Organization," in *Comparative Socioecology: The Behavioural Ecology of Humans and Other Mammals*, ed. V. Standen and R. Foley (Oxford: Blackwell, 1989), 243–64.
  58. Burghardt, "Animal Awareness."
  59. Kennedy, *New Anthropomorphism*, 89.
  60. "[A]nthropomorphism works: attributing motives and strategies is often the best way for an observer to predict what an individual is likely to do next" (Cheney and Seyfarth, *How Monkeys See the World*, 303).
  61. D. O. Hebb, "Emotion in Man and Animal: An Analysis of the Intuitive Processes of Recognition," *Psychological Review* 53 (1946): 88.
  62. Kennedy, *New Anthropomorphism*.
  63. See B. Azar, "Binti's Efforts to Save Boy May Be Part of Her Biology," *American Psychological Association Monitor* (Nov. 1996); K. Davidson, "Scientist Debate Animal Motives," *San Francisco Examiner*, Aug. 28, 1996.
  64. F. B. M. de Waal, *Good Natured: The Origins of Right and Wrong in Humans and Other Animals* (Cambridge, Mass.: Harvard University Press, 1996); de Waal, *Bonobo: The Forgotten Ape* (Berkeley: University of California Press, 1997); de Waal and F. Aureli, "Consolation, Reconciliation, and a Possible Cognitive Difference between Macaque and Chimpanzee," in *Reaching into Thought: The Minds of the Great Apes*, ed. A. E. Russon, K. A. Bard, and S. T. Parker (Cambridge: Cambridge University Press, 1996), 80–110. In *Bonobo*, de Waal relates a striking instance of animalcentric perspective-taking in a bonobo: "Betty Walsh, a seasoned animal caretaker, observed the following incident between a seven-year-old female bonobo, named Kuni, and a bird. Based on her familiarity with feathered flying objects, Kuni seemed to realize what kind of assistance the bird needed. The incident occurred at Twycross Zoo, in England.

"One day, Kuni captured a starling. Out of fear that she might molest the stunned bird, which appeared undamaged, the keeper urged the ape to let it go. Perhaps because of this encouragement, Kuni took the bird outside and gently set it onto its feet, the right way up, where it stayed looking petrified. When it didn't move, she threw it a little, but it just fluttered. Not satisfied, Kuni picked up the starling with one hand and climbed to the highest point of the highest tree where she wrapped her legs around the trunk so that she had both hands free to hold the bird. She then carefully unfolded its wings and spread

them wide open, one wing in each hand, before throwing the bird as hard she could towards the barrier of the enclosure. Unfortunately, it fell short and landed onto the bank of the moat where Kuni guarded it for a long time against a curious juvenile. By the end of the day, the bird was gone without a trace or feather. It is assumed that, recovered from its shock, it had flown away" (156).

65. On a videotape of the incident (and in *Stern* of Sept. 5, 1996) one can see Binti sit down upright on a log in a stream while correctly positioning the unconscious boy, cradling him in her lap. It almost seems as if she is trying to put him on his feet. After this she gives him a brief, reassuring back-pat before continuing on her way. The Brookfield gorillas might not have reacted the same to an adult person (i.e., they probably recognized the boy as a youngster), and they certainly would not have reacted this way to a sack of flour. They would probably have been afraid of the sack at first, but then have opened it, causing a mess (Jay Peterson, curator at the Brookfield Zoo, personal communication).
66. Quoted in Radner and Radner, *Animal Consciousness*, 140.