

BETWEEN THE SPECIES

Decentering Anthropocentrism: A Functional Approach to Animal Minds

ABSTRACT

Anthropocentric biases manifest themselves in two different ways in research on animal cognition. Some researchers claim that only humans have the capacity for reasoning, beliefs, and interests; and others attribute mental concepts to nonhuman animals on the basis of behavioral evidence, and they conceive of animal cognition in more or less human terms. Both approaches overlook the fact that language-use deeply informs mental states, such that comparing human mental states to the mental states of nonlinguistic animals is misguided. In order to avoid both pitfalls — assuming that animals have mental lives just like we do, or assuming that they have no mental lives at all — I argue for a functional methodological approach. Researchers should study animal cognition by identifying environmental inputs, the functional role of internal states, and behavioral outputs. Doing so will allow for cross-species comparisons in a way that the use of folk psychological terms does not.

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“If a lion could talk, we could not understand him.”
— Ludwig Wittgenstein

Introduction

Some of the most influential Western philosophers, including Aristotle, Aquinas, Descartes, Kant, and Hegel, have distinguished human beings from nonhuman animals on the basis of mental phenomena. Although humans have a nonrational part to them (the body), they are different in kind from (nonhuman) animals because of their capacity to reason, their intellect, or their souls. Human beings are said to have minds, while animals are believed to be merely sophisticated biological machines whose behavior is driven by instinct and conditioned by external stimuli.

In the wake of Darwin, the continuity between humans and animals has been widely recognized, to the point where many contemporary philosophers and scientists attribute mental concepts, sometimes very sophisticated mental operations, to animals. In addition to the physical homologies arising from a common evolutionary ancestor, they claim that humans and some animals also share mental homologies, such as the capacity to feel pain and pleasure (Singer 2002); the having of interests, including a categorical interest in continuing to live (Regan 2004); the ability to categorize experiences based on abstract concepts (Vauclair 1996); causal reasoning (Call 2006); an understanding of others' mental states (Premack and Woodruff 1978); and even a kind of rudimentary moral agency (Bekoff and Pierce 2009).

These two groups of theorists come to very different conclusions regarding the inner lives of animals: one group argues for humans' uniqueness, and the other group identifies compa-

rable mental traits in both humans and animals. Although these interpretations seem to contradict one another, both of them presuppose an underlying anthropocentrism regarding mental phenomena, and thus they fail to understand animal cognition as unique to its kind. Specifically, both groups approach animal cognition in terms of human-centered, folk psychological concepts, and then either attribute them to animals or deny that animals have them — anthropomorphism and anthropodenial (de Waal 1997), respectively.

In this paper, I argue that, in order not to mischaracterize animal cognition through the lens of anthropocentrism, we must avoid appealing to subjective mental states and instead use functional criteria to identify the continuities between humans and animals. That is, we must identify physiological states, including brain states, that connect experimental stimuli and behavioral outputs, and make comparisons between species based on the functional role that they play. Only then can we avoid the pitfalls of anthropocentric thinking to which both approaches are susceptible.

Inhuman Beasts or Furry Humans?

The traditional approach to the human-animal divide is well known and needs no extended discussion here. It suffices to say that, for much of Western intellectual history, animals have served as a kind of foil against which we define ourselves (Derida 2008; Oliver 2009). Unlike animals, humans are rational beings who use complex language, make ethically informed decisions, have a sense of history, and participate in culture. For example, Descartes (1637) describes animals as mere bodies that lack souls and thus move by a kind of mechanical operation, in contrast to humans, who also have immaterial souls and are capable of rational thinking and autonomous action.

Descartes's heirs among contemporary comparative psychologists include Derek Penn, Jennifer Vonk, and Daniel Povinelli, among others. For example, Povinelli and Vonk claim that the behavior of chimpanzees, unlike human behavior, can be explained in terms of relatively simple behavioral rules that they form based on observation of others' behavior (rather than making inferences about others' psychological states), and that their tool use and understanding of causal principles are different from ours because of their inability to generalize from specific cases (Povinelli 2003; Povinelli and Vonk 2003; Povinelli and Vonk 2006; Lurz 2011). Penn and Povinelli conclude that "human minds" are "qualitatively different" from animals' cognitive faculties in several ways, especially because we, unlike animals, are able to "reinterpret" our experience conceptually "in terms of higher-order, structural, role-governed relations" (Penn et al. 2009). All of these theorists believe that humans are capable of a kind of abstract thinking that animals, even the most complex animals, are not.

Despite this longstanding tendency to define ourselves in opposition to animals, there is a corresponding tendency (among both researchers and the general public) to assign humanlike qualities to nonhuman things, especially animals. For many scientists who study animal cognition, man is still the measure of all things in the sense that they reduce the complexity and uniqueness of animal life to something that we can describe in rational or human terms. For the most part, comparative psychologists reject Povinelli's conclusions and commit themselves, implicitly or explicitly, to an argument by analogy: if mental states cause observable behaviors in human beings, then similar behaviors in animals must be caused by similar mental states. The principle of parsimony, which, in the study of animal cognition, is traditionally identified as Morgan's Canon

(1894, 53), has given way to what Frans de Waal, reflecting the current anthropocentric trend in comparative psychology, calls the principle of “evolutionary parsimony”: “if closely related species act the same, the underlying mental processes are probably the same, too” (de Waal 2006, 62). The assumption here is that animals who are like us, or who behave in similar ways, share similar subjective states, and that we can thus use the same mental concepts — beliefs, desires, and intentions, for example — to explain their behavior as our own.

It is difficult to accept that de Waal’s approach is parsimonious, even if it seems intuitively correct, since it multiplies the number of unverifiable cognitive processes to which we are committed. Still, many comparative psychologists have (implicitly or explicitly) adopted this principle as an interpretive presupposition in their scientific research. To give only one example, Anderson, Gillies, and Lock (2010) describe how a group of captive chimpanzees responded to the death of a group-member, and they claim that “several aspects of their behaviour recall those of mothers with dying infants, and are strikingly reminiscent of human responses to peaceful death” (R350). They list the different responses of the chimps, followed by “possible human counterparts,” including testing for vital signs and trying to resuscitate the corpse, and they conclude that, like humans, chimpanzees have an “awareness of death” (R350, R351). Since David Premack and Guy Woodruff’s (1978) seminal article claiming that chimpanzees have a “theory of mind” by which they attribute beliefs, desires, and intentions to other individuals, many comparative psychologists have also designed experiments with the aim of demonstrating that nonhuman animals (not only chimpanzees) are like furry or feathered people — with an understanding of meaning,

the ability to represent the future, and cultures that are worthy of anthropological study.

Language and Cognition

Unfortunately, when researchers conceive of animal minds as variations on the human mind, they misunderstand the function of language in the having of mental states. Without language — or, more precisely, without our way of conceptualizing ourselves and the world through language — animals cannot be said to engage in cognitive processes that are anything like human thinking. R. G. Frey makes this point with regard to the seemingly basic ability of all sentient beings to have interests. According to Frey (1980), animals are incapable of having interests, or even having basic desires (as a kind of interest), because in order to have interests, animals must be able to have beliefs, and in order to have beliefs, they must have language. Insofar as they lack language, then, they also lack interests. Donald Davidson makes a similar claim: animals cannot have beliefs because the mental concepts necessary for beliefs, including the capacity to have the concept of a belief and the ability to interpret the intentionality of others (who hold the subject to account for what he or she claims), are too intellectually rich for nonlinguistic animals to have (Davidson 1975, 1985; Fellows 2000).

A simple thought experiment will illustrate their claims. Imagine that you are eating at the dinner table, and your dog comes up and sits next to you. You may say, “He wants some food.” That sounds simple enough. However, for this to make sense, the dog would have to have a number of constituent beliefs: “There is food on the table.” (A belief about objects and relationships between objects.) “This discomfort I feel is a sign of hunger.” (A causal claim: lack of food causes pain.) “I can

get the food by sitting here.” (Practical reasoning.) “Sitting here will motivate the person to give me food.” (Understanding intentional action by another person.) And so on. The problem is that the dog is incapable of believing anything because there is no sense in which he can assent to or even understand a declarative sentence such as “There is food on the table.” And if he does not believe that there is food on the table, then there is no way for him to want the food on the table. Animals are incapable of having beliefs because, among other things, they are incapable of having second-order thoughts about their perceptions — namely, that their perceptions may or may not track the world. Therefore, any animal that lacks language lacks beliefs. And any animal that lacks beliefs lacks desires.

This is not to deny that animals try to fulfill their basic needs, including the need to eat. But to label an animal’s inner state (that gives rise to a behavior) as a desire is to equate it with a mental event in humans that is very different from what must be the cognitive process in animals. Although all animals (including humans) have instincts that motivate them to engage in rigidly defined behaviors, only human beings have what can properly be called desires, which we consciously accept or reject, which we invest with psychological significance, and which are interpreted and transformed in idiosyncratic ways based on social conditions. For example, a hungry newborn seeks out a breast, whether it is a human child or a giraffe, but only in human beings does this basic instinct take on meaning within a web of beliefs and give rise to a plurality of expressions, including eating disorders, fetishes, and other psychologically powerful associations.

Many people’s first impulse is to dismiss Frey and Davidson as reflexive anthropocentrists. However, in order to rebut their

claims, one must attribute a kind of rudimentary cognition to animals that is independent of language, and this depends on a wrongheaded assumption that language and thinking are only contingently (and not essentially) related. Thus many people believe that animals think, and think much as we do, even though they do not have the language to express their thinking. Cameron Buckner (2013), for example, claims that animal cognition and human cognition could be compared as long as “we do our best to provide animals with learning histories and cultural scaffolding comparable to those enjoyed by the human subjects purported to satisfy the [competence] criteria” (866). To test for a theory of mind among chimpanzees, then, he suggests that we study wild (non-captive) chimpanzees just as we study “free-ranging” humans, observe chimpanzees interacting with other chimps (and not in relation to human researchers) just as we observe humans interacting with other humans, and so on (866) — as if a chimpanzee in the wild has the same “cultural scaffolding” when it comes to understanding themselves and others that a human has who is immersed, more or less since birth, in linguistic concepts that define human thinking.

Contrary to the assumption that thinking and language are separable in principle, we have come to understand how deeply our thinking is shaped and even made possible by language. This is one of Wittgenstein’s revolutionary insights. Sometimes we pretend that, when we first learn language, we are assigning words to concepts that we already have. Wittgenstein claims that this account of language, as a vehicle for thought, only really makes sense if we already have a language (2009). Our language picks out the features of reality that matter (to our culture or linguistic group) and ignores others. What we do not have language for remains inarticulate, undetermined, and obscure — not really thoughts at all. To think of language as

the act of labeling objects, including mental objects (whatever that means), conceives of us as spectators, viewing the world and putting names to things. Instead, according to Wittgenstein, language is a “form of life” (2009, §§19, 23, 241). In this vein, Daniel Dennett (1995, 1997) has appealed to language, and the deep ways in which language and experience are intertwined, to deny that animal consciousness (if there is such a thing) is anything like human consciousness.

In response to philosophers such as Frey and Davidson, some cognitive ethologists, comparative psychologists, and philosophers have argued that animals do in fact have rudimentary concepts and even beliefs. Bernard Rollin is typical. He gives the example of a dog that sees what appears to be water: “An animal may see shimmering on asphalt and believe it to mean water (even as we do), but he is ‘publicly’ corrected when he reaches the road and finds no water there” (Rollin 1990, 141). According to Rollin, a dog has the same kind of mental experience that humans have (“even as we do”) when one of our beliefs is challenged. “The dog approaches the road, thinking that there is water there” — that is how we would think if we perceived what the dog is perceiving. When the dog discovers that there is no water, he changes his belief: “There is no water there.” He asserts something else, much as we would upon discovering the mirage. And even though the dog does not engage other language users to correct this belief — which Davidson thinks is necessary for the having of beliefs — Rollin insists that the belief can be tested (or “‘publicly’ corrected”) in other ways, such as confronting the facts of the world.

To justify the claim that dogs or other animals have this kind of inner life, there must be some evidence (beyond merely assuming de Waal’s principle of evolutionary parsimony) that the

behavior can only be explained or can be best explained by appealing to mental concepts. There is no such evidence here. More likely, the dog approaches something that looks like water because, when it has done so in the past, it has been able to drink. Its behavior has been reinforced with positive stimuli. The dog walks away because the shimmering on the asphalt cannot quench its thirst. We need not assume that there is a belief present in order to explain the dog's actions. A simpler explanation in terms of behavioral conditioning does just as well.

Descartes claims that language serves as a sign that indicates the existence of thoughts behind it (Descartes 1985, 140-41; 1991, 302-3, 366). We can reject this conception of language and still insist that, without language, animals cannot have the complex system of beliefs that is necessary for them to have desires. However, if animals have no desires, then it does not make sense to say that animals suffer, because they have no desires that are frustrated. Here is where the refusal to apply mental concepts to animals seems to lead to absurd consequences. Even if animals are incapable of beliefs, evolutionary continuity and common sense support the hypothesis that many animals experience pain. Vertebrate animals have nervous systems that are similar to ours, endogenous opioids appear under physical stress, and they respond to harmful stimuli much as we do, with cries or attempts to escape the cause of the pain. In addition, the mammalian pain system has distinct sensory and affective pathways that can be dissociated pharmacologically and surgically. This has led numerous researchers to claim that all vertebrates, and perhaps some invertebrate animals, are pain-conscious (sentient) organisms (Allen et al. 2005; Shriver 2006). Given the many physiological and behavioral similarities, it seems appropriate to apply de Waal's principle of evolu-

tionary parsimony and conclude that all vertebrates, human and nonhuman, are able to experience pain.

We like to think that we can isolate the feeling of pain from our interpretation of pain. For example, although most researchers working on animal cognition tend to use “pain” and “suffering” interchangeably (Dawkins 1980, 1990), Dennett tries to differentiate the immediate feeling of “pain” from concept-laden “suffering.” He claims that some nonhuman animals may be capable of pain, “depending on how we choose to define that term,” but they cannot suffer because they “lack the sort of over-arching, long-term organization that leaves room for significant suffering” (Dennett 1995, 707-8). Temple Grandin makes a similar distinction between “the sensory component of pain” and “feelings about the pain,” which she also calls “suffering” (Grandin 2005, 180-87). Like Descartes, Dennett and Grandin assume that language merely labels inner phenomena that stand apart from and are unaffected by the language that we use. Pain is some fact of the matter that is transformed into suffering through the activity of thinking in terms of concepts. However, we cannot have an experience, including the feeling of pain, apart from concepts. Our subjective experiences are temporally situated by us in a narrative and are made sense of using conceptual tools that are made possible by language.

The Pitfalls of Folk Psychology

According to much of the Western philosophical tradition, humans are rational beings and animals are nothing but dumb brutes. As animals have been shown to engage in sophisticated behaviors such as tool use, inferential reasoning, and deception, however, many cognitive ethologists have assumed that animals must be capable of complex mental operations, and in fact that their thinking is *like ours*. Both sides of the debate

share a kind of Cartesian logic: they assume that *either* some animals think like humans do *or* they have no inner life whatsoever. The comparison is always to human cognition. And so, researchers on animal cognition tend to describe animals in human terms, as having a theory of mind, beliefs, and a certain rudimentary kind of rationality, on par with what humans have at a particular stage of mental development. Rather than questioning the Cartesian dichotomy, they simply draw the line differently, bringing some animals over to the side that had been populated exclusively by humans.

We ought to resist both alternatives, neither of which can accommodate evolutionary continuity *and* the crucial (especially linguistic) differences between humans and nonhuman animals. Instead of animals having no interests and desires, or having interests and desires like we do, there is a third possibility: that animals have mental states, including what we may call desires (for lack of a better term), but not desires in any sense that we would recognize if we had them. One can see here that language runs aground. We do not know what to call whatever it is that animals have, because we can only grasp the subjective character of our own inner lives. How do we make sense of this? Given our ways of thinking and our language, we seem not to know how to comprehend animal cognition without either making it nothing (anthropodenial) or likening it to what we experience (anthropomorphism), both of which, I have shown, are forms of anthropocentric bias.

When Dennett considers whether animals have a point of view on their own experiences, he poses a rhetorical question: “When we consider a creature that isn’t a teller — has no language — what happens to the supposition that one of *its* stories is privileged?” (Dennett 1995, 704). Given the inability of ani-

mals without language to conceptualize themselves and their experiences (at least in the same way that we do), attempts to understand animal cognition using our own mental predicates is hopelessly misguided. It is hardly illuminating to talk about consciousness in animals at all, given that consciousness in humans is so ill-defined, but calling animal consciousness a “primary” or “primitive” form of consciousness, or a “precursor” to human consciousness — language that is widely used in comparative psychology — does not make the concept more precise. Johan Bolhuis and Clive Wynne conclude that such comparisons between human and animal mentation stifle progress in the study of animal cognition: “As long as researchers focus on identifying human-like behavior in other animals, the job of classifying the cognition of different species will be forever tied up in thickets of arbitrary nomenclature that will not advance our understanding of the mechanisms of cognition” (Bolhuis and Wynne 2009, 833). Similarly, William Mason claims that the use of folk psychological terms covers over our lack of understanding when it comes to human mental processes: “Mind . . . lacks ‘thing quality’; it is but a construct, hardly more than a label, really, for complex processes and functions that we are still far short of understanding in any creature, including ourselves” (Mason 1976, 931). Because we describe our own cognitive processes in ill-defined, unscientific terms, the anthropomorphic tendency to understand animal cognition in human terms is bound to confuse rather than illuminate.

Anthropomorphism is so compelling because we continue to define the human mind in folk psychological terms. By appealing to folk psychology, however, we are using a form of explanation that is confused to begin with, and we simply extend it to animals. According to Allen and Beatrix Gardner, this leaves comparative psychologists with two possible explanations of

what they are doing when they attribute mental concepts, especially the notion of intentionality, to animals: “To the extent that intention only stands for a correlation between an internal stimulus and an external response, it explains nothing. On the other hand, to the extent that human beings are explaining their behavior when they speak of intentions . . . their explanations can be as false as any other explanations” (Gardner and Gardner 1986, 480). The former interpretation is the most charitable reading of what anthropomorphic researchers are doing: attaching a poorly understood mental label to a well-understood behavioral phenomenon. The problem is that many researchers take themselves to be doing the latter: making claims about the internal lives of animals *based on* behavioral research, inferential claims that are either true or false. When they do this, their inferences about animal cognition are at best false because of the absence of a shared language between humans and animals. Worse than that, such claims may be unfalsifiable nonsense, given the challenges facing our attempts to define folk psychological terms in ways that are scientifically respectable (Churchland 1988; Churchland and Churchland 1996). As long as researchers insist on referring to subjective states as hallmarks of mindedness, they cling to a theory that inevitably limits what they can reliably say about animal cognition.

The Promise of Methodological Functionalism

To make real progress in comparative psychology, without the intellectual baggage of (the two forms of) anthropocentrism, researchers ought to adopt a functional approach to mind — not necessarily as a theory of what the mind is, but as a methodological presupposition. That is, researchers studying animal cognition should talk about environmental inputs, the functional role of internal states, and behavioral outputs rather than attributing humanlike psychological concepts to animals,

and they should remain agnostic about what kind of subjective states animals have. If we cannot find a way around folk psychological concepts — if, as Pamela Asquith claims, “anthropomorphism is unavoidable or inevitable” because ethologists are bound by “established semantic fields in ordinary human discourse” (Asquith 1984, 139, 145) — then such concepts should be understood as shorthand descriptions of inner states (whatever they are) that play the same functional roles for humans and animals. Mental properties are replaced by or reduced to functional properties.

A functionalist methodological approach allows us to remain agnostic about folk psychological similarities, neither to deny them nor to attribute them across species, while continuing to study animal cognition and its relation to human cognition. This approach may sound similar to the recent suggestion by Kristin Andrews that researchers ought to start from the bottom-up rather than by assuming cognitive similarities from the beginning that are then justified by empirical research:

empirical research on animal cognition aims to determine which attributions are truly attributable to different species, whereas the charge of anthropomorphism is a pre-empirical obstacle to this research. Rather than focusing on the obstacle, I suggest that we ignore it as a prejudice, and instead work on developing methods for testing the applicability of specific properties. (Andrews 2009, 52)

Andrews’s approach is promising. The problem is that empirical methods can, at best, establish functional states and not subjective, cognitive states, which seem, after all, to be what Andrews is after: to validate the attribution of subjective men-

tal traits (or “properties”) across species. Researchers cannot “ignore” anthropocentrism as long as they seek ultimately either to apply or to withhold folk psychological concepts on the basis of empirical research — that is, either transforming animals into feathered or furry humans, or excluding them from the community of thinkers because they do not think like we do. As long as Andrews and others define mental properties in folk psychological terms, they are not discoverable and anthropocentric projections are inevitable. Researchers can best get beyond anthropocentrism by putting aside the terminology that inevitably defines animals in relation to humans’ subjective mental states.

By focusing on functional similarities, researchers will be able to explore evolutionary continuity between humans and animals without reducing one to the other. Consider pain once again. If we define pain as a subjective feeling, then animals can only experience pain if they have the state of consciousness that we have when we are in pain. However, it is more scientifically tenable to understand pain in functional terms. If the animal’s inner state serves the same function as the feeling of pain does in human beings — if there is a similar causal relationship between sensory inputs, internal states, and behavioral outputs as there are in humans — then the organism is in pain, no matter what the animal’s subjective experience is. Philosophers such as Frey, who deny that animals feel pain, assume that pain is a feeling that must be set in relation to certain beliefs. But some animals, most notably vertebrates, have inner states that serve the same adaptive function as the feeling of pain does for us. Because of that, they can be said to be in pain, functionally construed, regardless of what they “feel” — that is, regardless of whether their subjective mental state is the same as ours.

Many evolutionary anthropologists have begun to take this approach in their research, eschewing mental terms in favor of functional criteria for making comparative claims. For example, Redouan Bshary's studies on fish and bird cognition examine the decision rules that give rise to social cooperation, tool use, and anti-predator behavior. And he suggests that these findings may be used to explain seemingly more complex primate behavior, without appealing to belief-desire formations (Bshary, Wickler, and Fricke 2002; Tebbich and Bshary 2004; Penn 2011). With the shift to a functionalist methodology, the comparison between human minds and animal minds becomes possible. Sensory inputs, neurochemical states, and behavioral outputs are able to be studied empirically across species. Comparative psychologists would still be studying animal cognition, but cognition understood in functional rather than folk psychological terms.

Despite the dubious scientific value of folk psychology, some functionalists, most notably David Lewis (1966, 1972) and D. M. Armstrong (1993), think that mental concepts could be identified with functional concepts. If that were to happen, however, the match-up would be species-specific rather than across species. For example, intentionality may serve a particular functional role for humans, but may not serve the same role for other animals, even if intentionality could (somehow) be attributed to them. There are individual but not universal type-type identities, so that, even if we talk about propositional attitudes as functional states giving rise to certain behaviors (the belief-desire model) generally in humans, the explanation would not apply to nonhuman animals. Therefore, even comparative psychologists who cling to folk psychology ought to forego such ill-defined mental terms with reference to animal mentation. The attributions made by philosophers and re-

searchers such as Singer, Regan, Vauclair, Call, Premack and Woodruff, and Bekoff would then become something other than anthropocentric projections.

Conclusion

Some animals can be said to experience pain and have interests, to make inferences, and to have an awareness of death. Such claims are supportable as long as they are equivalent to discernible functional similarities, but they are not supportable if they are supposed to be inferences about animals' subjective mental states, discovered on the basis of similar behaviors in humans and animals. When comparative psychologists adopt functionalism as a methodological assumption, they can help us to advance beyond anthropocentrism, to see the commonalities among humans and animals, and to conceive of animal cognition on its own terms.

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References

- Allen, Colin, Perry N. Fuchs, Adam Shriver, and Hilary D. Wilson. 2005. "Deciphering Animal Pain." In *Pain: New Essays in the Nature of Pain and the Methodology of Its Study*, edited by Murat Aydede. Cambridge: MIT Press.
- Anderson, James R., Alasdair Gillies, and Louise C. Lock. 2010. "Pan Thanatology." *Current Biology* 20: R349-51.

- Andrews, Kristin. 2009. "Politics or Metaphysics? On Attributing Psychological Properties to Animals." *Biology and Philosophy* 24: 51-63.
- Armstrong, D. M. 1993. *A Materialist Theory of the Mind*. Rev. ed. London: Routledge.
- Asquith, Pamela J. 1984. "The Inevitability and Utility of Anthropomorphism in Description of Primate Behaviour." In *The Meaning of Primate Signals*, edited by Rom Harré and Vernon Reynolds. Cambridge: Cambridge University Press.
- Bekoff, Marc, and Jessica Pierce. 2009. *Wild Justice: The Moral Lives of Animals*. Chicago: University of Chicago Press.
- Bolhuis, Johan J., and Clive D. L. Wynne. 2009. "Can Evolution Explain How Minds Work?" *Nature* 458: 832-33.
- Bshary, Redouan, Wolfgang Wickler, and Hans Fricke. 2002. "Fish Cognition: A Primate's Eye View." *Animal Cognition* 5: 1-13.
- Buckner, Cameron. 2013. "Morgan's Canon, Meet Hume's Dictum: Avoiding Anthropofabulation in Cross-Species Comparisons." *Biology and Philosophy* 28: 853-71.
- Call, Josep. 2006. "Descartes' Two Errors: Reason and Reflection in the Great Apes." In *Rational Animals?* edited by Susan Hurley and Matthew Nudds. Oxford: Oxford University Press.

- Churchland, Paul M. 1988. "Folk Psychology and the Explanation of Human Behavior." *Proceedings of the Aristotelian Society* 62: 209-21.
- Churchland, Paul M., and Patricia S. Churchland. 1996. "The Future of Psychology, Folk and Scientific." In *The Churchlands and Their Critics*, edited by Robert N. McCauley. Cambridge: Blackwell.
- Davidson, Donald. 1975. "Thought and Talk." In *Mind and Language*, edited by Samuel D. Guttenplan. Oxford: Clarendon.
- Davidson, Donald. 1985. "Rational Animals." In *Actions and Events: Perspectives on the Philosophy of Donald Davidson*, edited by Ernest LePore and Brian P. McLaughlin. Oxford: Basil Blackwell.
- Dawkins, Marian Stamp. 1980. *Animal Suffering: The Science of Animal Welfare*. London: Chapman and Hall.
- Dawkins, Marian Stamp. 1990. "From an Animal's Point of View: Motivation, Fitness, and Animal Welfare." *Behavioral and Brain Sciences* 13: 1-61.
- Dennett, Daniel C. 1995. "Animal Consciousness: What Matters and Why." *Social Research* 62: 691-710.
- Dennett, Daniel C. 1997. *Kinds of Minds: Towards an Understanding of Consciousness*. New York: Basic.
- Derrida, Jacques. 2008. *The Animal That Therefore I Am*. Edited by Marie-Louise Mallet. Translated by David Wills. New York: Fordham University Press.

- Descartes, René. 1985. *Discourse on the Method*. In *The Philosophical Writings of Descartes*, vol. 1, edited and translated by John Cottingham, Robert Stoothoff, and Dugald Murdoch. Cambridge: Cambridge University Press.
- Descartes, René. 1991. "Letter to the Marquess of Newcastle, 23 Nov. 1646." In *The Philosophical Writings of Descartes*, vol. 3, edited and translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, and Anthony Kenny. Cambridge: Cambridge University Press.
- Descartes, René. 1991. "Letter to Henry More, 5 Feb. 1649." In *The Philosophical Writings of Descartes*, vol. 3, edited and translated by John Cottingham, Robert Stoothoff, Donald Murdoch, and Anthony Kenny. Cambridge: Cambridge University Press.
- de Waal, Frans. 1997. "Are We in Anthropodenial?" *Discover*, http://discovermagazine.com/1997/jul/areweinanthropod1180#.UWG_V6JOOSo.
- de Waal, Frans. 2006. *Primates and Philosophers: How Morality Evolved*. Edited by Stephen Macedo and Josiah Ober. Princeton: Princeton University Press.
- Fellows, Roger. 2000. "Animal Belief." *Philosophy* 75: 587-98.
- Gardner, R. Allen, and Beatrix T. Gardner. 1986. "Discovering and Understanding the Meaning of Primate Signals." *British Journal for the Philosophy of Science* 37: 477-95.

- Grandin, Temple. 2005. *Animals in Translation: Using the Mysteries of Autism to Decode Animal Behavior*. New York: Scribner.
- Frey, R. G. 1980. *Interests and Rights: The Case against Animals*. Oxford: Clarendon.
- Lewis, David. 1966. "An Argument for the Identity Theory." *Journal of Philosophy* 63: 17-25.
- Lewis, David. 1972. "Psychophysical and Theoretical Identifications." *Australasian Journal of Philosophy* 50: 249-58.
- Lurz, Robert W. 2011. *Mindreading Animals: The Debate over What Animals Know about Other Minds*. Cambridge: MIT Press.
- Mason, William A. 1976. "Windows on Other Minds." *Science* 194: 930-31.
- Morgan, C. Lloyd. 1894. *An Introduction to Comparative Psychology*. New York: Scribner's.
- Oliver, Kelly. 2009. *Animal Lessons: How They Teach Us to Be Human*. New York: Columbia University Press.
- Penn, Derek C. 2011. "How Folk Psychology Ruined Comparative Psychology and How Scrub Jays Can Save It." In *Animal Thinking: Contemporary Issues in Comparative Cognition*, edited by Rudolf Menzel and Julia Fischer. Cambridge: MIT Press.
- Penn, Derek C., Keith J. Holyoak, and Daniel J. Povinelli. 2008. "Darwin's Mistake: Explaining the Discontinuity

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between Human and Animal Minds.” *Behavioral and Brain Sciences* 31: 109-30.

Penn, Derek C., and Daniel J. Povinelli. 2009. “On Becoming Approximately Rational: The Relational Reinterpretation Hypothesis.” In *Rational Animals, Irrational Humans*, edited by Shigeru Watanabe, Aaron P. Blaisdell, Ludwig Huber, and Allan Young. Tokyo: Keio University Press.

Povinelli, Daniel J. 2003. *Folk Physics for Apes: The Chimpanzee's Theory of How the World Works*. New York: Oxford University Press.

Povinelli, Daniel J., and Jennifer Vonk. 2003. “Chimpanzee Minds: Suspiciously Human?” *Trends in Cognitive Sciences* 7: 157-60.

Povinelli, Daniel J., and Jennifer Vonk. 2006. “We Don’t Need a Microscope to Explore the Chimpanzee’s Mind.” In *Rational Animals?* edited by Susan Hurley and Matthew Nudds. Oxford: Oxford University Press.

Premack, David, and Guy Woodruff. 1978. “Does the Chimpanzee Have a Theory of Mind?” *Behavioral and Brain Sciences* 1: 515-26.

Regan, Tom. 2004. *The Case for Animal Rights*. Rev. ed. Berkeley: University of California Press.

Rollin, Bernard E. 1990. *The Unheeded Cry: Animal Consciousness, Animal Pain and Science*. Oxford: Oxford University Press.

- Shriver, Adam. 2006. "Minding Mammals." *Philosophical Psychology* 19: 433-42.
- Singer, Peter. 2002. *Animal Liberation*. Rev. ed. New York: Harper Perennial.
- Tebbich, S., and R. Bshary. 2004. "Cognitive Abilities Related to Tool Use in the Woodpecker Finch, *Cactospiza pallida*." *Animal Behaviour* 67: 689-97.
- Vauclair, Jacques. 1996. *Animal Cognition: An Introduction to Modern Comparative Psychology*. Cambridge: Harvard University Press.
- Wittgenstein, Ludwig. 2009. *Philosophical Investigations*. 4th ed. Translated by G. E. M. Anscombe, P. M. S. Hacker, and Joachim Schulte. Malden: Wiley-Blackwell.