
10 Cognitive Ethology at the End of Neuroscience

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Eliminative Materialism is the thesis that our common-sense conception of psychological phenomena constitutes a radically false theory, a theory so fundamentally defective that both the principles and the ontology of that theory will eventually be displaced, rather than smoothly reduced, by completed neuroscience.

—Paul Churchland (1981, p. 67)

A Short, Simple History

In the beginning, humans were animals. Accounts of the belief systems of aboriginal peoples often emphasize the fact that these peoples viewed themselves as continuous with the rest of nature (Whitt et al. 2001). Animals were worshiped, hunted, and respected. They were also agents with whom one made agreements (Martin 1978), and in some cases even entered into conjugal relationships (Passmore 1974). Of course aboriginal peoples distinguished between those who were members of their own group and those who were outsiders. But in many cases some animals were considered insiders and other humans were treated as outsiders. Thus, for many aboriginal peoples, life was fully lived in inter-species communities.

Then along came humanism. There are many ways of characterizing humanism and dating its arrival. Viewed historically, it was a cultural movement that arose during the Italian Renaissance, although it looked back to the classical world. Protagoras's oft-quoted remark, "man is the measure of all things," however it was originally intended, conveys the spirit of humanism. Humanism can broadly be characterized as "[A]ny philosophy concerned to emphasize human welfare and dignity, and optimistic about the powers of unaided human understanding" (Blackburn 1994, p. 178). On this view, humans are seen as morally distinctive, and the moral difference between humans and other animals is typically thought to rest on a nonmoral categori-

cal distinction—for example that humans are different from other animals in being rational; or that only humans are capable of language, tool use, or some other favored activity.

The rise of humanism and modern science was temporally coincident, and humanism's optimism about human understanding helps to explain this association. Humanism advocated science on the ground that scientific knowledge contributes to human welfare. Humanism thus provided a justification for modern science's inauguration of the large-scale, systematic infliction of pain and death on nonhuman animals in the pursuit of knowledge. Indeed, since there are no elephant Galileos, the very practice of science itself also helped to distinguish humans from other animals. Some might say that humanism was the theory and science was the practice.

The great exemplar of humanism's attitude toward animals was the seventeenth-century thinker, René Descartes. Descartes, who is often regarded as the founder of modern philosophy, also did important work in optics and analytical geometry. He emphasized the importance of reason and exalted humans over other animals.

Descartes was a dualist in at least two respects. First, he taught that humans are composed of two interacting substances: a material substance that is the body and an immaterial substance that is the mind. Second, he was a dualist with respect to the relation between humans and the rest of nature. Humans and other animals are distinct because while non-human animals are material substances, humans are essentially immaterial substances associated with material substances. Stated simply, his view was that while humans are minded creatures, nonhuman animals are organic automata who are not harmed when they are subjected to invasive procedures. An unknown contemporary wrote of the scientist followers of Descartes that

[T]hey administered beatings to dogs with perfect indifference; and made fun of those who pitied the creatures as if they felt pain. . . . They nailed poor animals up on boards by their four paws to vivisect them and see the circulation of the blood which was a great subject of controversy. (Quoted in Rosenfield 1968, p. 54)

Humanism died in 1859 with the publication of Darwin's *On the Origin of Species*, but it has not yet become extinct; it remains a "dead man walking." Various philosophers (e.g., Rachels 1990) have shown how evolutionary theory undermines the human claim to categorical uniqueness, thus rendering views about the moral distinctiveness of humans implausible. Whether we look at humans behaviorally, taxonomically, or genetically, the categorical distinction that is supposed to underwrite the moral difference between humans and other animals does not seem to obtain. Behaviorally, the overwhelming similarities between humans and many other animals are obvious to anyone who bothers to pay close attention (see, e.g., Bekoff 2000). Taxonomically, humans are one of several species of great ape, more closely related to chimpanzees than chimpanzees are to gorillas or orangutans. Genetically, the similarities are overwhelming. Commenting on the publication of the human genome, Svante Pääbo wrote:

The first comparisons will be between the human genome and distantly related genomes such as those of yeast, flies, worms, and mice . . . [w]e share much of our genetic scaffold even with very distant relatives. The similarity between humans and other animals will become even more evident when genome sequences from organisms such as the mouse, with whom we share a more recent common ancestor, become available. For these species, both the number of genes and the general structure of the genome are likely to be very similar to ours . . . [T]he close similarity of our genome to those of other organisms will make the unity of life more obvious to everyone. No doubt the genomic view of our place in nature will be both a source of humility and a blow to the idea of human uniqueness.

However, the most obvious challenge to the notion of human uniqueness is likely to come from comparisons of genomes of closely related species. We already

know that the overall DNA sequence similarity between humans and chimpanzees is about 99%. When the chimpanzee genome sequence becomes available, we are sure to find that its gene content and organization are very similar (if not identical) to our own. The result is sure to be an even more powerful challenge to the notion of human uniqueness than the comparison of the human genome to those of other mammals. (Pääbo 2001, p. 1219)

For much of the twentieth century behaviorism held sway. It became the "normal science" of university psychology departments and for the most part happily coexisted with prevailing humanist values. Although many behaviorists considered themselves materialists, in some respects their doctrine was oddly unbiological. While they emphasized the importance of learning, they minimized the role of underlying biological structures and seldom attempted evolutionary explanations. The word "evolution" rarely appears in the foundational treatises of the movement; there are six occurrences in the index in Skinner (1953), and none at all in the index in Watson (1930). However, Watson and Skinner did not flinch from the radical antihumanist implications of their theory. Watson, reflecting on his Columbia University lectures of 1912 and the storm of criticism they provoked, wrote that

We believed then, as we do now, that man is an animal different from other animals only in the types of behavior he displays. . . . Human beings do not want to class themselves with other animals. . . . The raw fact that you, as a psychologist, if you are to remain scientific, must describe the behavior of man in no other terms than those you would use in describing the behavior of the ox you slaughter, drove and still drives many timid souls away from behaviorism. (Watson 1930, p. v)

The very title of Skinner's book, *Beyond Freedom and Dignity*, indicates the lengths he was willing to go in articulating the antihumanist case.

At least two sources contributed to the decline of behaviorism. One was the development of

more biological understandings of behavior in the work of such classical ethologists as Konrad Lorenz and Niko Tinbergen. The other was the cognitive revolution that originated with the work of Noam Chomsky in linguistics, and then migrated into philosophy and psychology. Chomsky's cognitivism was developed in direct response to Skinner's behaviorism. In his devastating review of Skinner's *Verbal Behavior*, Chomsky (1959) showed that behaviorist learning theory, which neglected the innate endowment of organisms, was not powerful enough to explain human linguistic behavior.

Three Questions about Cognitive Ethology

The cognitive turn came late to ethology, dating perhaps from Griffin (1976/1981). Although most of the central concepts and claims in this field are contested, we can start with the simple thought that cognitive ethology proposes that some behavior of some animals can be explained by reference to their cognitive and affective states. Cognitive states are typically understood as representational states produced by natural selection. Representational states are in turn characterized by their semantic content. So, cognitive ethology proposes to explain some animal behavior by reference to semantic content. A simple example of such an explanation is this: Grete (my dog) walks to the door because she wants to go out. Wanting to go out is a representational state that figures in the explanation of her behavior.

There are many different ways of filling in the details of this program. The proffered explanations could be causal or noncausal. They may or may not involve psychobehavioral laws. Content could be wide or narrow. A story must also be told about the relationship between cognitive explanations and those that might be given for the phototropic behavior of plants or the heat-seeking behavior of missiles. However these are questions that I shall put aside. Instead, there are three questions that I wish to explore. The first

two are relatively straightforward: First, what is the relation between cognitive ethology and folk psychological explanation? Second, how can we discover the content of an animal's thought? Finally, I wish to return to the epigraph to this essay and comment on the very large question of whether the rise of neuroscience is a threat to cognitive ethology.

On the first question, it may appear that the future of cognitive ethology is essentially linked to the fate of folk psychology. Certainly part of the intuitive case for cognitive ethology flows from the naturalness of applying folk psychological categories and generalizations to nonhuman animals. Grete, like my mother, sometimes gets jealous, and both Grete and my mother get testy when they are frustrated. Some cognitive ethologists do not shrink from explicitly endorsing such folk psychological explanations of animal behavior. This is apparent in *The Smile of a Dolphin*, a remarkable book in which eminent ethologists, behavioral ecologists, psychologists, sociologists, and anthropologists let their hair down and describe their most memorable encounters with nonhuman animals. The chapter headings say it all: "love"; "fear, aggression, and anger"; "joy and grief"; and "fellow feelings." I myself am not at all chary about applying folk psychological vocabularies and generalizations to both my mother and to Grete. However, the question here is whether cognitive ethology necessarily stands or falls with the tenability of folk psychology. I claim that it does not.

Folk psychology provides one way of providing cognitive explanations, but it is not the only way. Perhaps concepts such as jealousy and frustration will be replaced by ones that more adequately individuate states and explain behavior. Someday more useful generalizations may be found for making behavior intelligible. Cognitive ethology can avail itself of improved cognitive and psychological theories without subverting itself. It is essential to cognitive ethology that its explanations appeal to representational states of organisms, but these states need not be the

familiar ones of folk psychology. Thus, the demise of folk psychology does not in itself portend the end of cognitive ethology.

This takes us to the second question of how we can identify the content of animals' cognitive states. Work on this issue has proceeded both from the top down and from the bottom up. Some researchers, including myself (for example in 1998), have insisted that animals think, but have generally avoided serious discussion of what they think. Others have sketched specific approaches for empirically characterizing concepts that might figure in an animal's cognitive economy (e.g., Allen 1999). The first sort of work sometimes seems unconvincing since the best evidence for the claim that an animal is thinking involves some account of the content of its thought. On the other hand, the second kind of work does not always seem very cognitive. Content that is inferred from fairly crude discrimination experiments and concepts that are straightforwardly reducible to neural states seem rather remote from human cognition. However, in my view, the difficulty in systematically characterizing the content of animals' cognitive states is not so much because there are problems with the various research strategies that have been employed as with the notion of content itself.

The concept of content plays a role in a particular way of conceiving the mind. On this view, a mental state involves a three-place relation between a creature, an attitude, and a content. For example, when Grete (the creature) believes that her treats are in the closet, she has the attitude of believing toward the content, "my treats are in the closet." When the matter is stated this way, it is easy to see why many are skeptical about whether languageless creatures can have cognitive states. If cognitive states are attitudes, and if contents are sentences, as they appear to be in the example given, then some fancy footwork is required to resist this skepticism. This is not the concern I wish to address here, however (see Allen and Bekoff 1997). My point at present is

simply that the notion of content occurs as part of a particular way of looking at the mind.

What I want to suggest is that content ascription is part of a practice used in order to make ourselves and others intelligible. Within this practice, content ascription is a heuristic that is fundamentally interpretative and interest relative. These features are reflected in "the holism of the mental" (Davidson 1999), a feature noted by Quine (1960) and vigorously advocated by Davidson throughout his career. Grete's behavior of walking to the door can be variously explained by mutually adjusting beliefs and desires. If we fix a desire, for example, that Grete wants to urinate, then we can specify a belief (for example, that on the other side of the door is a place in which it is appropriate for her to urinate) that will make the behavior intelligible. But if we fix a different desire (for example, that Grete wants to play with Jethro), then we will have to adjust Grete's beliefs accordingly in order to explain the behavior.

This story about the interactions between contents and attitudes ramifies. While not anything goes, content ascriptions answer to various pragmatic concerns, including those involving other content ascriptions, and not only to what it is known about the organism's body and the world in which it is embedded. For this reason we should not expect content ascriptions to be uniquely determined by empirical observation.

If I am right about this, then assigning content is as much a matter of marshaling conceptual considerations as empirical ones. There will not be a decisive observation or critical experiment that will uniquely determine what an animal "really" thinks. However, it does not follow from this that what an animal thinks is unknowable or a matter of inference or guesswork. For such a skeptical view presupposes that there is some determinate fact of the matter to know, infer, or guess. What I am suggesting is that it is the very nature of content specification, thus cognitive explanation, to be plural and indeterminate and therefore conceptually, not just

empirically, grounded. To be blunt, there is no unique fact of the matter about what a nonhuman animal “really” thinks.

This is not a weakness of cognitive ethology. For there is no unique fact of the matter about what you or I “really” think. The same slackness that is at work in content attributions to nonhuman animals is at work in content attributions in humans as well. However, this is obscured by familiarity, deference, and especially language. But linguistic behavior is behavior nonetheless, and the task of the interpreter is not in principle different when faced with my verbalization or Grete’s tail wagging (see also Jamieson 1998; Jamieson and Bekoff 1992).

The view that I am urging is not entirely original. Its origins are in Quine and Wittgenstein, and it owes a lot to philosophers who have already been cited. In substance, my view may be closest to Dennett’s. The key idea is that we should not expect to find propositional attitudes or their ilk written in the brain or anywhere else. Instead, propositional attitudes are attributed by interpreters who take the “intentional stance” (Dennett 1987). These attributions are ways of keeping track of what the organism is doing, has done, and might do. The propositional attitudes are like a grid projected onto a field. What gives the grid-points their significance is their relation to other grid-points, not their absolute locations in the field. Grid-points and propositional attitudes are means of sorting, classifying, and assessing rather than invariant, sober, descriptions of aspects of the world. On this view we attribute propositional attitudes to humans and nonhumans for the same reason: in order to keep track of behavior.

Since his earliest writings on cognitive ethology, Dennett (1987) has attempted to balance “romantic” interpretations of animal behavior with “killjoy” understandings. In his recent work, the killjoy seems to have gained the upper hand. He has become more scientific in his views and seems now to believe that there are real biological differences between humans and other animals

that count against attributing propositional attitudes to most nonhumans (1996, p. 132). He has also come to think, as many did before him, that the hyperintensionality afforded by language marks an important difference in the cognitive possibilities of humans and other animals (1996, p. 159). Finally, perhaps motivated in part by the scientism, he seems uncomfortable with the moral uses to which cognitive attributions to nonhumans have been put (1996, p. 161ff).

This is not the place to attempt to thwart Dennett’s slide into conventional orthodoxies about nonhuman animals. I will confine myself to two remarks. First, a thoroughgoing interpretivist should not be scientific (here I side with Davidson against Quine). Scientific statements must also be interpreted, and they are as indeterminate and inscrutable as nonscientific statements. Second (as I have already noted), in principle for an interpreter, the task is the same whether confronted with my verbalizing or Grete’s tail wagging. Davidson provides a surprising reason for this (especially in light of his own views with respect to animal minds):

[W]e have erased the boundary between knowing a language and knowing our way around the world generally. . . . I conclude that there is no such thing as a language, not if a language is anything like what many philosophers and linguists have supposed. (Davidson 1986, p. 446)

This brings us to our final and deepest question. What would be the fate of cognitive ethology in a world in which every behavior yielded to neuroscientific explanation? My own view is that while this would bring an end to cognitive science generally, including cognitive ethology specifically, it would not necessarily put a stop to the productive deployment of cognitive vocabularies. For these vocabularies have a place in everyday discourse, whatever their status as theoretical terms. In particular, they often carry our evaluational attitudes. Cognitive language is closely tied to practices of moral appraisal—of blaming, praising, and so on. Thus, if such lan-

guage were to outlive its scientific usefulness, it would not necessarily vanish. It might still have other roles to play in everyday life.

Consider an analog from physics. We have been instructed by our epistemological betters that space and time do not exist as independent dimensions with linear structures. Yet this has not led to the abolition of the alarm clock. Even in the face of relativity theory, we speak usefully and responsibly of the sun rising and setting, although no reasonable person thinks that these notions should figure in a scientific conception of the world.

These considerations seem to suggest an important moral for cognitive ethology. If the logic of neuroscientific explanation is quite different from that of cognitive explanation, as I seem to be suggesting, then it will be a dangerous mistake to mix them in an unreflective way. Nevertheless, much of the literature of cognitive ethology does just this. Many scientists seem to go back and forth between neural and cognitive explanations, as if they were working with the same vocabularies, at the same levels of description, employing the same logic of explanation (for examples, see Griffin 1992). They seem to assume that microlevel explanations simply reveal what subserves macrolevel phenomena, while leaving macrolevel phenomena untouched. But that is far from obvious. As Paul Churchland points out in the epigraph, macrolevel phenomena are sometimes displaced, rather than smoothly reduced, by microlevel explanations. This is exactly the concern that many people have about the Human Genome Project, fearing that genetic-level explanations will drive out the language of responsibility.

The suggestion of confusion can be resisted by showing that in fact cognitive and neuroscientific explanations work in the same way. One strategy would be to construe cognitive explanation in a way that is as determinate and mechanical as neuroscientific explanation. The second strategy would be to show that neuroscientific explanation is itself as pluralistic and indeterminate as cognitive explanation. There might be two rea-

sons for thinking this. One reason would be because explanation itself is pragmatic and pluralistic (perhaps this view is implicit in Quine 1960). A second reason would involve claiming that neuroscientific explanation itself appeals to content and thus has the same features as any other content explanation. Patricia Churchland seems to suggest this when she writes:

It is important ... to emphasize that when neuroscientists do address such questions as how neurons manage to store information, or how cell assemblies do pattern recognition, or how they manage to effect sensorimotor control, they are addressing questions concerning neurodynamics—concerning information and how the brain processes it. In doing so, they are up to their ears in theorizing, and even more shocking, in theorizing about representations and computations. (Patricia Churchland 1986, p. 361)

What I have been suggesting could be summarized by saying that cognitive explanations are appropriate when we are too ignorant to give real (i.e., neural) explanations. I resist this way of putting the point for the reasons suggested in the preceding paragraph, but there is something right about this view. Once we achieved a physical understanding of the occurrence of lightning, we no longer had to appeal to the moods of the gods. However, even if things inexorably move toward micro and mechanical explanations of behavior, and away from macro and functional ones, cognitive ethology will still have performed a great service. Some of its contributions are methodological. It returns scientists to the field; it requires that they watch animals, that they reflect on behavioral similarities and singularities, and so on. However, from a larger cultural perspective, the real contribution of cognitive ethology is that it helps to complete the circle and restore unity to our picture of nature.

Conclusion

I opened this essay with a short, simple history of human attitudes toward animals. Some may quarrel with the history, disagree with my ac-

count of the science, or rightly claim that it is all much more complicated than I suggest. What cannot be denied or evaded is that this science has a moral dimension. How we study animals and what we assert about their minds and behavior greatly affects how they are treated, as well as our own view of ourselves. Humanism is dead and its foundation is in tatters, but the full force of this fact has not yet been felt. Cognitive ethology helps us to accept this by showing that the same explanations that apply in one case often apply in the other as well. This is an important scientific lesson, but it also carries deep and profound moral lessons. Indeed, it is because of these moral lessons that some people find this science to be subversive.

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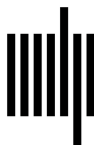
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