Finding the green-eyed monster in the brain of a dog

Commentary on **Cook et al.** on *Dog Jealousy*

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Abstract: That dogs show behavior suggestive of jealousy has long been known and has been demonstrated under controlled conditions. Cook et al. have now shown arousal in the amygdala when dogs see a caregiver feeding another dog. This finding has ethical significance in two respects. First, the consideration shown by the investigators for the welfare of their experimental subjects sets an example for other researchers using animals. Second, the greater understanding of the emotional lives of animals should lead to more concern for their needs.

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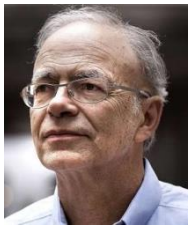

O, beware, my lord, of jealousy;
It is the green-eyed monster which doth mock
The meat it feeds on
Shakespeare, *Othello,* 3.3

"Everyone has seen," Charles Darwin (1874) writes in *The Descent of Man,* "how jealous a dog is of his master's affection, if lavished on any other creature; and I have observed the same fact with monkeys" (p. 71). In contrast to an emotion like anger, jealousy seems to require more sophisticated mental abilities. It involves awareness of a social triangle in which a rival poses a threat to an existing relationship. One might therefore doubt that dogs are capable of jealousy. Darwin (1874), however, had no doubt that "the various emotions and faculties, such as love, memory, attention, curiosity, imitation, reason, &c., of which man boasts, may be found in an incipient, or even sometimes in a well-developed condition, in the lower animals" (p. 126). The evidence he gathered in support of this view became too extensive to be included in full in *The Descent of Man,* so he published it as a separate volume, *The Expression of the Emotions in Man and Animals* (Darwin, 1872).

Darwin's successors embraced the evidence for our anatomical continuity with nonhuman animals but were less comfortable with the idea that our mental life is not unique. Some criticized his use of anecdotes and stories, which they disparaged as unscientific anthropomorphism, a projection of our own mental states onto other animals. Then from the 1920s to the 1960s, the

study of animals in psychology was dominated by behaviorism, the view that science should confine itself to observable phenomena, and hence say nothing about mental states. Perhaps it was easier to perform appalling experiments in which dogs were given prolonged, inescapable electric shocks when the dogs were not described as howling in pain and cowering in fear, but as "vocalizing" and showing "aversive behavior" (Singer, 2009, Ch. 2).

Not until the 1970s, with the rise of evolutionary psychology, did scientists once again begin to consider the implications of the fact that the mental difference between human and nonhuman animals is, as Darwin put it, "one of degree and not of kind." Now, scientists are conducting carefully controlled experiments that suggest Darwin was right about our mental continuity with animals, as he was about our anatomical continuity.

This extends even to jealousy. Christine Harris and Caroline Prouvost, of the University of California, San Diego, showed that when a dog's caregiver interacted with and talked sweetly to a replica of another dog, the caregiver's dog behaved very differently from when the caregiver interacted with an inanimate object. The dog was significantly more likely to snap or bite at the fake dog, and push at the owner, or to attempt to get between the owner and the apparent rival. The researchers consider that their findings support the view that there is a "primordial form of jealousy," where the use of the term "primordial" refers to "a state that motivates jealous action tendencies that are similar across dogs and humans" (Harris and Prouvost, 2014).

Harris and Prouvost decline to draw inferences that go beyond their evidence, so they note that their findings "do not speak to whether the subjective experience of the emotional state is similar." It is true, of course, that similar behavior could arise from different subjective experiences, so that statement, strictly construed, is true. Nevertheless, in our daily lives we are constantly drawing on the behavior of the other humans with whom we interact in order to make inferences about their subjective experiences. "He seemed anxious," we may say, or "She would not have done that unless she was really angry." We usually get it right, though we may be mistaken; and when we cross species boundaries, we are more likely to be mistaken. That is the grain of truth in the accusations of anthropomorphism. Now, however, another kind of evidence has become available.

As Peter Cook and colleagues (2018) describe in the target article, dogs watch their caregivers interact with a fake dog, including providing the fake dog with food; the dogs also watch similar interactions between their caregiver and an inanimate object that did not resemble a dog. The novel feature of their work is that while the dogs were watching the interactions, their brains were being scanned.

In contrast to the innumerable psychological experiments conducted over many decades that have inflicted severe pain on sentient beings (Singer, 2009), Cook's dogs were trained, with rewards, not punishment, to be still when in the scanner. They were given ear protection, and were free to leave, but none did leave.

Unlike the dogs in the experiments carried out by Harris and Prouvost, the dogs in Cook's experiments did not behave aggressively when they saw their caregiver interact with the fake dog. This is, however, likely to have been due to the restraining effect of their training, for the scans showed activation in the amygdala, a region of the brain associated with emotional states in humans such as anger, anxiety, fear and jealousy. Dogs previously shown to have a stronger temperamental inclination towards aggression towards other dogs showed more arousal than dogs lacking that inclination (Cook et al., 2018).

Thus, in addition to the behavioral evidence of jealousy in dogs, related in innumerable dog-owner anecdotes and more rigorously tested by Harris and Prouvost, we now know that when dogs observe situations similar to those that we recognize as likely to arouse jealousy in humans, the same parts of their brains are aroused as would be aroused in humans. This still falls short of proof that the subjective experience of dogs is similar to that of humans, but we might regard it as sufficient to shift the burden of proof. For practical purposes, we should assume that jealousy is typically a distressing subjective experience in dogs, as it is in humans.

We may hope that this further evidence of the continuity between our emotional lives and those of dogs should lead to greater concern about the ways in which we commonly treat them. It seems likely that many other social mammals have similarly rich emotional lives. Our belief in our own uniqueness predisposes us to a blinkered view of the emotional capacities of nonhuman animals, and this in turn means that we do not take sufficient care to avoid causing them harms that we might not, without the evidence outlined above, believe that they can experience.

References

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The Other Minds Problem: Animal Sentience and Cognition

Overview. Since Descartes, philosophers know there is no way to know for sure what — or whether — others feel (not even if they tell you). Science, however, is not about certainty but about probability and evidence. The 7.5 billion individual members of the human species can tell us what they are feeling. But there are 9 million other species on the planet (20 quintillion individuals), from elephants to jellyfish, with which humans share biological and cognitive ancestry, but not one other species can speak: Which of them can feel — and *what* do they feel? Their human spokespersons — the comparative psychologists, ethologists, evolutionists, and cognitive neurobiologists who are the world's leading experts in "mind-reading" other species — will provide a sweeping panorama of what it feels like to be an elephant, ape, whale, cow, pig, dog, bat, chicken, fish, lizard, lobster, snail: This growing body of facts about nonhuman sentience has profound implications not only for our understanding of human cognition, but for our treatment of other sentient species.

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