Researchers, not dogs, lack control in an experiment on jealousy

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

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Abstract: Cook and colleagues (2018) have developed a clever method to measure fMRI in awake dogs in response to a number of interesting stimuli. As a result, they are able to determine neural correlates of observable behavior. They report that dogs may experience something akin to jealousy because they show greater amygdala activation in response to food being given to a fake dog versus food being placed in a bucket. However, several critical controls are missing which prevent the authors from being able to speak of jealousy.

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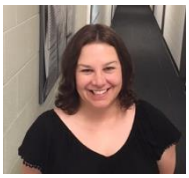

"*Dogs are our link to paradise. They don't know evil or jealousy or discontent*."
Milan Kundera

The above quote from Kundera exemplifies the most conservative assessment of dogs' capacity to experience emotion. On the other end of the spectrum, people routinely attribute complex emotions to their pets. Recently developed methodology for measuring fMRI in awake canines has been a game changer in accessing brain correlates of cognitive and behavioral processes previously inaccessible to researchers. One longstanding question of interest to comparative psychologists and the public alike is whether other species experience emotions similar to those experienced by humans. There is little doubt that animals experience fear and anger – two adaptive emotions that facilitate appropriate protective responses in the presence of threatening stimuli. Animals' experience of other emotions, however, is less evident. Do they experience happiness and sadness? Animal correlates of even more complex emotions, such as shame, disgust, pride, and jealousy may be even more difficult to ascertain. Cook and colleagues (2018) have just published findings that suggest that dogs may experience jealousy when human caretakers deliver food to other dogs.

Although the authors are to be commended for the methodological advances in studying dogs' emotional experiences, the current experiment cannot distinguish between jealousy and other internal states. The comparison of responses to a fake dog versus a familiar neutral object are not valid. First, a fake dog is likely to be an unfamiliar and strange object. It may well be puzzling that it looks like a dog and yet does not smell, sound, or move like a dog. Although the researchers took care to rub the fake dog with the scent of another dog, it is unlikely that it emitted an odor commensurate with a real dog. In addition, the fake dog did not move, even

when offered food, which would certainly be anomalous to observe. The subjects did not appear to be familiarized with the fake dog before being tested in the scanner. When presented with such an unfamiliar object, dogs are likely to be distressed and to respond as if in the presence of a threat. The neurological response to threat or confusion may be indistinguishable from that of jealousy. This experiment requires control conditions where fake dogs are present but not receiving attention/affection/food from caregivers, or perhaps are receiving attention from a stranger or disliked individual. Such controls were also lacking from a previous study that claimed to find evidence of jealousy in dogs when human owners interacted with a stuffed dog (Harris & Prouvost, 2014).

In addition, dogs may perceive the food that goes into a bucket as still being available, whereas food that disappears into a fake dog may be perceived as no longer available. Thus, the dogs may be reacting to the likelihood of being able to access the food rather than out of jealousy. The authors acknowledge that they cannot rule out that dogs may show the same activation any time a perceived conspecific is present. Although they argue that it would be difficult to control the behavior of a real conspecific in the testing situation, they could present owners responding to another human, especially a child, which might also evoke feelings of jealousy. They could also present the fake dog in a context where it was not being "fed" or receiving attention from humans.

In Figure 2A, it appears that there are three groups of dogs in the moderate-sized sample; seven dogs with low dog-directed aggression scores, four dogs with intermediate scores, and two dogs with relatively higher scores. In each of these groups, dogs were quite variable in terms of their amygdala activation. The data appear to violate the assumption of homoscedasticity. That is, the data points are not distributed evenly across the variable of owner-reported dog-directed aggression. Instead, more than half of the data points are at the low end, with owners essentially reporting no aggression for these dogs. Thus, I am also skeptical about the reported relationship between dog-directed aggression scores and amygdala activation.

At a conceptual level, it is likely that being upset over losing a physical resource to another evokes a different emotional response, even in humans, compared to the kind of upset one experiences when one loses the attention or affection of another with whom one has a strong emotional bond. Is it still jealousy when one is upset by the loss of a valuable resource? It is unclear whether the neurological response measured here represents jealousy or arousal or irritation or surprise. Psychologists should take great care to define emotions operationally and use these definitions in a consistent and rigorous manner without using sensationalistic terminology to attract attention to what are otherwise provocative findings. Emotions are challenging enough to study without introducing confusion at the conceptual level.

References

Cook, P., Prichard, A., Spivak, M., & Berns, G. S. (2018). Jealousy in dogs? Evidence from brain imaging. *Animal Sentience* 22(1).

Harris, C. R., & Prouvost, C. (2014). Jealousy in dogs. *PLoS ONE* 9(7): e94597.

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 to mammals, 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, chicken, mouse, 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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