Comment on "Differential Sensitivity to Human Communication in Dogs, Wolves, and Human Infants"

Sylvain Fiset

Topál *et al.* (Reports, 4 September 2009, p. 1269) reported that dogs' sensitivity to reading and using human signals contributes to the emergence of a spatial perseveration error (the A-not-B error) for locating objects. Here, I argue that the authors' conclusion was biased by two confounding factors: the use of an atypical A-not-B search task and an inadequate nonsocial condition as a control.

Ten-month-old infants, after having found a hidden object at a first hiding location (A), persistently continue to search at location A even after observing the object being hidden at a second location (B). This perseverative error (called the A-not-B error) is typical of Stage 4 of Piaget's sensorimotor period of cognitive development but rapidly vanishes at 12 months of age when the infants reach Stage 5 (*1*). Topál *et al.* (*2*) recently reported that domestic dogs, but not wolves, make the A-not-B error, but solely if humans give them ostensive-referential cues during the manipulation of the object (i.e., looking back and forth between the hiding location and the dog, calling the dog's name). Topál and colleagues suggested that dogs' sensitivity to human communicative cues contributes to the emergence of the A-not-B error in dogs and arises from convergent social cognition of humans and dogs as a consequence of domestication.

Surprisingly, Topál *et al.* (*2*) neglected to refer to Gagnon and Doré (*3*, *4*), who, by means of transversal and longitudinal studies, discovered that domestic dogs do not make the A-not-B error during the sensorimotor period. Interestingly, the A-not-B procedure used by Gagnon and Doré (*3*, *4*) also included some forms of social interaction between the experimenter and the dog before (eye contact and verbal commands) and after (verbal praises) the manipulation. Although the results of Gagnon and Doré (*3*, *4*) contrast with those reported by Topál *et al.* (*2*), the latter could still argue that the timing for giving referential cues is crucial because it is precisely the introduction of the ostensive-communicative cues during the hiding of the object that accounts for why dogs exhibited the A-not-B error.

The results of Topál *et al.* (*2*), however, can be explained by factors other than dogs' propensity to use human signals. First, Topál *et al.* (*2*) used an atypical A-not-B search task. In the B trials, the researchers did not move the object directly behind location B, but rather moved it first at location A, where it momentarily disappeared, and then subsequently hid it at location B. According to the Piagetian framework of object permanence, the B trial described in (*2*) is not a problem of Stage 4 but corresponds to a sequential visible displacement problem, which is commonly used to investigate a higher level of object permanence (Stage 5). Although adult dogs are known to be able to solve problems of Stage 5 (*3*–*7*) and, therefore, demonstrate flexibility in finding hidden objects, the search task used in (*2*), in addition to introducing communicative cues, required higher attentional demands than the typical Stage 5 problem. In the social conditions described in (*2*), the experimenter visibly held the object in her hand about 1.5 m from the floor and walked toward the hiding locations. When she hid the object at location A and B, however, she bent herself and brought the object at the floor level while providing communicative cues [see movies S2 and S4 in (*2*)]. In a typical problem of Stage 5, however, the object remains at the floor level during the entire manipulation and no other cues are given.

As a consequence, the difference between dogs and wolves in the social-communicative condition reported by Topál *et al.* (*2*) could be attributed to an interaction between the attention demands required to follow the roller-coaster trajectory of the object in the B trials and the human communicative signals. Interestingly, dogs have a relatively short and variable attention span for social cues (*8*), supporting the hypothesis that dogs' attentional state is a potential confounding variable while studying search behavior of hidden objects in a social context. On the other hand, wolves, having a brain about 20% larger than dogs (*9*), could have a higher attention span than dogs for tracking objects and may be less prone to interference from social cues. Unfortunately, although wolves outperformed dogs in certain kinds of physical problems (*10*) and pointing tasks (*11*), no study has yet investigated how wolves sustain their attention toward moving objects and perform in object permanence tasks.

Another problem with the Topál *et al.* (*2*) study is that there were some methodological discrepancies between the social and nonsocial conditions, which could explain why dogs—but not wolves—exhibited the A-not-B error. In the nonsocial condition (control), the object was pulled with the help of a transparent string at floor level, facilitating the visual tracking of the object [see movies S5 and S6 in (*2*)]. As described before, in the social conditions, however, the object roller-coastered between each target location, increasing the attentional demands. Moreover, in the social conditions, after the disappearance of the object, the experimenter always walked behind position B and returned to her starting position (*12*). Given that Gagnon and Doré (*7*) have shown that the displacement of an irrelevant container after the disappearance of an object significantly decreased the performance of dogs in an object search task, it could be argued that in Topál *et al.* (*2*), the experimenter's movements in the social conditions have potentially worsened the performance of dogs in these trials. Interestingly, this last critique indirectly supports the hypothesis claiming that dogs have a short attention span for tracking disappearing objects.

In summary, Topál *et al.*'s (*2*) conclusion suggesting that dogs' sensitivity to human communicative signals contributes to the emergence of the A-not-B error was the result of two confounding factors: (i) the use of an atypical A-not-B search task and (ii) an inappropriate nonsocial condition as the control. I therefore urge Topál *et al.* to test dogs' and wolves' sensibility to human communicative cues by using a typical A-not-B search task [see (*3*, *4*)] and to standardize the manipulation of the object in social and nonsocial conditions [for an example, see (*6*)]. If the authors find the same significant differences as those they recently reported, then they would have some evidence that dogs' sensitivity to human signals emerges from convergent social cognition of humans and dogs due to domestication. For the moment, however, the evidence is not sufficiently convincing.

Secteur des Sciences Humaines, Université de Moncton, Campus d'Edmundston, Edmundston, New-Brunswick E3V 2S8, Canada. E-mail: sylvain.fiset@umce.ca

References and Notes

1. J. Piaget, *La Construction du Réel chez l'Enfant* (Delachaux and Niestlé, Neuchatel, ed. 4, 1937).
2. J. Topál, G. Gergely, A. Erdohegyi, G. Csibra, A. Miklósi, *Science* **325**, 1269 (2009).
3. S. Gagnon, F. Y. Doré, *J. Comp. Psychol.* **108**, 220 (1994).
4. S. Gagnon, F. Y. Doré, *J. Comp. Psychol.* **106**, 58 (1992).
5. E. Collier-Baker, J. M. Davis, T. Suddendorf, *J. Comp. Psychol.* **118**, 421 (2004).
6. S. Fiset, V. Leblanc, *Anim. Cogn.* **10**, 211 (2007).
7. S. Gagnon, F. Y. Doré, *Anim. Learn. Behav.* **21**, 246 (1993).
8. F. Range, L. Horn, T. Bugnyar, G. K. Gajdon, L. Huber, *Anim. Cogn.* **12**, 181 (2009).
9. R. Coppinger, L. Coppinger, *Dogs: A Startling New Understanding of Canine Origin, Behavior, and Evolution* (Scribner, New York, 2001).
10. H. Frank, M. G. Frank, in *Man and Wolf: Advances, Issues, and Problems in Captive Wolf Research*, H. Frank, Ed. (W. Junk, Dordrecht, Boston, 1987), pp. 143–167.
11. M. A. R. Udell, N. R. Dorey, C. D. L. Wynne, *Anim. Behav.* **76**, 1767 (2008).
12. I want to thank an anonymous reviewer for pointing out this methodological artifact.
13. This work was supported by a discovery grant from the Natural Sciences and Engineering Research Council of Canada (203747-07).

30 October 2009; accepted 14 June 2010
10.1126/science.1184045

Science
AAAS

Comment on "Differential Sensitivity to Human Communication in Dogs, Wolves, and Human Infants"

Sylvain Fiset

Science **329**, 142 (2010);
DOI: 10.1126/science.1184045