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## Inferring emotion without language: Comparing canines and prelinguistic infants

Commentary on [Kujala](#) on *Canine Emotions*

**Stefanie Hoehl**

Faculty of Psychology  
University of Vienna

**Abstract:** Research on canine emotions has to deal with challenges quite similar to psychological research on social and emotional development in human infants. In both cases, verbal reports are unattainable, and behavioral and physiological methods have to be adjusted to the specific population. I will argue that both regarding empirical approaches and conceptual work, advances in research on social-cognitive development in human infants can inform the study of canine emotions.

[Stefanie Hoehl](#) is Professor of Developmental Psychology at the University of Vienna and research group leader at the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig. Her research focuses on social cognition in early human development. [entw-psy.univie.ac.at/en/about-us/staff/stefanie-hoehl/](http://entw-psy.univie.ac.at/en/about-us/staff/stefanie-hoehl/)



Research on emotions in dogs, as aptly reviewed by Kujala (2017), has to deal with many of the same limitations and challenges as research with human infants. Neither population can provide introspective data through verbal reports. Behavioral investigations are constrained by the limitations of verbal instructions and of the motor behaviors that can be assessed. Physiological data are much more difficult to obtain in infants and dogs than in healthy human adults (though not impossible). These circumstances lead to several parallels between the research areas, both in the questions addressed and the associated debates (e.g., the correspondence of emotional expressions in infants and adults and the meaning of morphological similarities; Camras & Shutter, 2010). In my commentary, I will propose that, as in the field of infant social cognition, in research on canine emotions it might make sense to distinguish between implicit and explicit processes: Implicit processes similar to those observed in pre-verbal human infants are more likely than explicit processes. I will illustrate by using two examples from Kujala — sense of self and empathy — of how a focus on implicit processes may provide particularly valuable insights into canine emotions.

### 1. Implicit vs. explicit processes

When human infants are tested with non-verbal paradigms, usually relying on eye gaze, they often display remarkable cognitive abilities, whereas even substantially older children struggle

with the same task in language-based tests. One prominent example is theory of mind, that is, the ability to consider and take into account the perspective of another person. Children up to the age of 3.5 to 4 years old display severe difficulties in verbal false-belief tasks requiring the simultaneous representation of one's own knowledge of reality and someone else's false belief about the same situation (Wellman et al., 2001). However, even 15-month-old infants' looking behavior suggests that they are expecting another person to act in accordance with the person's false beliefs about the location of an object (Onishi & Baillargeon, 2005). These seemingly contradictory findings can be reconciled within a framework assuming two distinct systems for mental state tracking: (1) an implicit, non-verbal system that is functional from early on in human ontogeny and highly efficient but also inflexible and limited in scope; and (2) a later developing explicit system that is highly flexible and depends on language and higher-order cognitive functions, such as executive functions (Apperly & Butterfill, 2009). Whereas both systems are assumed to be functional in human adults, infants are only able to use the implicit system. The same may be true in other domains of social cognitive and emotional functioning, and the same may be true in dogs. Implicit processes, such as those discussed below, can be expected to be phylogenetically older than explicit, language-based processes and may well be preserved in non-human mammals.

## **2. Self-awareness without passing the mirror-test?**

Kujala points out that the level of self-awareness of dogs is currently unclear, as they do not succeed in the mirror-self-recognition task usually considered the litmus test of a person or species possessing explicit self-awareness. Infants under the age of 18 months also typically fail the classic mirror tests. Does that mean that they have no self-awareness? As reviewed by Rochat and Striano (1999), quite a lot of evidence points to infants having an implicit sense of self (sometimes referred to as "minimal self"), consisting of a perceived sense of agency and body ownership. For example, newborns show fewer rooting responses (i.e., head-turning and sucking movements in search of the mother's breast elicited by gently stroking the cheek) when touching themselves on the cheek than when being touched by another person (Rochat & Hespos, 1997). They also respond with less contagious crying to recordings of their own cries compared to other infants' cries. Similarly, dogs seem to be able to discriminate their own scent-markings from those of other dogs (Bekoff, 2001). Thus, instead of relying on mirror-self-recognition as a test of explicit self-awareness, more research into an implicit sense of self, based on body ownership and agency, might show how similar canine sense of self is to that of pre-verbal infants.

## **3. Empathic concern or just emotional contagion?**

Another topic concerning canine emotions brought up by Kujala illustrating parallels with research on early human development is empathy and altruistic helping. Similar to the contagious crying response in infants, dogs show stress-related behavior when listening to conspecifics' whining (Quervel-Chaumette et al., 2016). This suggests some form of emotional contagion or emotional resonance taking place in dogs. This is also considered a fundamental aspect of human empathy: combined with the ability to distinguish self from other and to

regulate emotion, this can lead to empathic concern (sometimes called compassion or sympathy) and adequate helping behavior (Decety & Meyer, 2008). Hearing the whines of a familiar dog also leads to specific affiliative behavior towards that dog in a later reunion. Kujala states that the underlying mechanisms remain unclear. However, at the very least, comfort-offering by dogs seems to be more than just emotional contagion with no self-other distinction or empathic concern. Similarly, while contagious or “reflexive” crying in infants was long considered evidence of indistinctive and rather rudimentary emotional contagion (Hoffman, 1975), more recent findings challenge this view. Roth-Hanania et al. (2011) report that infants show other-oriented concern to the caregiver’s signals of distress in the absence of signs of self-distress in the first year. This suggests that even in pre-verbal infants, emotional resonance paired with an implicit sense of self can lead to other-directed empathic concern. The same may be true of dogs.

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