

Opinion piece

**‘Canis empathicus’?
A proposal on dogs’
capacity to empathize
with humans**

Empathy has long attracted the attention of philosophers and psychologists, and more recently, of evolutionary biologists. Interestingly, studies suggest that empathy is a phylogenetically continuous phenomenon, ranging across animals from automatic emotional activation in response to the emotions of others, to perspective-taking that becomes increasingly complex with increasing brain size. Although suggestions have been made that the domestic dog may have the capacity to empathize with humans, no discussion has yet addressed the topic, nor have experimental routes been proposed to further explore the level of emotional and cognitive processing underlying dogs’ seemingly empathic behaviour towards humans. In this opinion piece, we begin by contextualizing our topic of interest within the larger body of literature on empathy. Thereafter we: (i) outline the reasons for why we believe dogs may be capable of empathizing with humans, perhaps even at some level beyond emotional contagion; (ii) review available evidence both pro and against our opinion; and (iii) propose routes for future studies to accurately address the topic. Also, we consider the use of dogs to further explore open questions regarding empathy in humans.

Keywords: behaviour; domestic dog; cognition; empathy; emotions

1. INTRODUCTION

Empathy is a social phenomenon that has long been at the centre of research (e.g. [1]). When we empathize, we vicariously ‘feel into’ the others and understand how they feel, which not only helps us engage in effective social communication but also may motivate us to behave pro-socially [2].

Recently, non-human empathy has also become the focus of attention spurred on, to some extent, by the influential paper of Preston & de Waal [3]. Interestingly, these authors outlined a sequence of progressively complex levels of empathy across animals that parallels the development of empathy in young humans. According to their proposal, early on in development, an automatic mechanism causes the state of an individual who experiences an emotional state (the object) to elicit a relevant, or similar, state in a perceiver (the subject)—the more interrelated the subject and the object, the more the subject will attend to the object, and the readier the emotional reaction. This limits empathy to emotional contagion because the

subject cannot distinguish their own emotions from others’ and has no control over emotional reactivity. Later on, as cognitive abilities are progressively layered upon automatic emotional activation, empathy goes beyond emotional contagion and develops, first into sympathetic concern (implying that the subject has the ability to discriminate between internally and externally generated emotions) and then into empathic perspective taking (implying that the subject can form a cognitive representation of the object’s emotional situation and needs, similarly to representing non-emotional states) [3]. In humans, the tendency to comfort others who are expressing emotional distress (probably grounded in sympathetic concern) develops around nine months of age and is followed by the emergence of spontaneous helping (probably driven by empathic perspective taking) around 14 months of age [4].

Although observable examples of emotional contagion in non-human animals have long been mentioned in the literature, only recently has experimental evidence started to emerge. Langford *et al.* [5] showed that mice intensify their responses to pain when perceiving cage mates, but not strangers, in pain; Parr [6] found that chimpanzees respond to video images of socially close conspecifics in distress by a vicarious emotional response and Davila Ross *et al.* [7] reported involuntary facial mimicry in orangutans. Note that facial mimicry has been linked to emotional contagion in humans, although it is still being discussed whether emotional conveyance results from mimicry or vice versa.

As suggestive evidence that sympathetic concern must also have emerged in a pre-human basis, some species (e.g. [8,9]) show consolation-like behaviours, that is, post-conflict affiliative interactions directed from a third party to the recipient of aggression and assumed to have a stress-alleviating function. Similarly, the basic forms of instrumental help demonstrated in chimpanzees have been associated to the capacity for empathic perspective taking ([4] but see [10]). Curiously, chimpanzees that grow up interacting with people not only appear to console and help conspecifics but also humans [4].

What about other animals living in close contact with humans, such as domestic dogs? Although the special relationship that dogs have developed with humans has been attracting increasing research interest, and a profound level of mutual understanding and shared emotion has already been suggested [11], no stringent proposal can be found in the literature on whether, and at what level, dogs may empathize with humans. This is even more remarkable in view of the strong possibility of convergent evolution between dogs and humans—sustained by the fact that dogs possess certain human-like social skills that non-human apes do not [12].

The present piece aims at laying the ground for systematic debate and investigation on dog empathy towards humans by presenting a critical discussion from which a coherent research programme might be designed. We consider that investigations on this topic may provide unique insights into the evolutionary processes as well as the mechanisms underlying human-like forms of this social phenomenon.

2. WHY WOULD DOGS HAVE THE CAPACITY TO EMPATHIZE WITH HUMANS?

There are three main reasons for why we believe that dogs may be able to empathize with humans, perhaps even at some level beyond emotional contagion. First, dogs originated from wolves [13], which are highly social animals that engage in cooperative activities and that probably have some capacity for empathy towards socially close conspecifics ([11], see also [14] and [15] for discussions on reconciliation and consolation in canid species). Second, biological changes produced during the domestication process (e.g. tameness) may have allowed dogs to use their inherited empathic capacities to synchronize with humans and predict their behaviour more flexibly than their ancestors (note that this follows the 'domestication hypothesis' proposed to explain dogs' special skills for communicating with humans; [16]). Third, breed diversification and selection for increasingly complex cognitive capacities [17] may have led to increasingly complex forms of empathy that now resemble certain traits of human emotional communication.

3. AVAILABLE EVIDENCE

Although only limited research has been done, we consider that dogs' capacity for emotional contagion and perhaps for some cognitive processing of humans' emotional states is supported by both anecdotal (e.g. [18]) and experimental data. Jones & Josephs [19] found that dogs react to their owners' stress with an increase in negative emotional arousal and Joly-Mascheroni *et al.* [20] showed that dogs can catch human yawns. It is noteworthy that, although Harr *et al.* [21] failed to replicate Joly-Mascheroni *et al.*'s [20] findings, differences in the type of stimuli that were used (live in Joly-Mascheroni *et al.* [20] versus video clips in Harr *et al.* [21]) may have contributed to the apparent discrepancy in their results. Curiously, contagious yawning has been connected to higher levels of empathy in humans, with studies suggesting that it probably shares a developmental basis with self-awareness and perspective taking [22].

Although dogs tend to fail the mirror self-recognition test [23] some authors, who have questioned the use of a single technique, based solely on visual cues, as the only valid test of self-awareness, claim that it might not indicate the absence of self-awareness required for empathic levels beyond emotional contagion (e.g. [11]). Indeed, a study showing that pets, namely dogs, behave as 'upset' as children when exposed to familiar people faking distress, strongly suggests 'sympathetic concern' [24]. Also, it has been reported that untrained dogs may be sensitive to human emergencies and may act appropriately to summon help [18], which, if true, suggests empathic perspective taking. The one study testing this idea in two experiments (in one dogs' owners feigned a heart attack and in another they experienced an accident in which a bookcase fell on them and pinned them to the floor) concluded, however, that dogs did not seem to understand the nature of the emergency or the need to obtain help [25]. We believe, however, that this does not discard the possibility for empathic perspective taking, as the

emergency scenarios might not have been sufficiently dramatic or realistic to be interpreted by the dogs as a real emergency. Also, olfactory cues may be important for dogs to accurately assess and respond to others' emotions. For instance, pheromones produced by a person suffering the pain and the stress of a real emergency may contribute to dogs' sense of a real emergency [11].

Since no additional studies have been conducted, one way to further discuss dogs' empathic potential is to employ research on mental state attribution (as in Koski & Sterck [26]). Studies show that when faced with a piece of forbidden food, dogs are quicker to take it if the experimenter cannot see them [27]. Contrastingly, dogs preferentially beg from a person that can see them [27]. While, to some authors, such findings are indicative of a simple foraging strategy based on the greatest chance of reinforcement (e.g. [28]), to others (including ourselves), they suggest that dogs may have the capacity to infer what humans see, know and feel (e.g. [27]). Likewise, there is a seemingly intractable debate around studies showing that dogs can use human pointing gestures to find hidden food (e.g. [29]). While some authors stress that this capacity can be accounted for by means of straightforward associative learning (e.g. [30]), others (including ourselves) defend the idea that dogs may actually understand that the person knows the location of food and is trying to convey this information to them (e.g. [27]).

Even though the scarcity of studies prevents us from drawing any firm conclusions, we consider that one should argue against those who criticize the attribution of complex abilities to animals if a major part of their argument lies on the need for parsimony (as in Broom [31]). Given the complex nature of the brain, this may be misleading, and it could slow down progress in science, to insist on accepting the simple explanation [31].

4. FUTURE DIRECTIONS

Clearly, there is a need for additional investigations to analyse the emotional and cognitive components that may be involved in dogs' seemingly empathic behaviour towards humans. While the former could be assessed by experimental studies subjecting dogs to human emotions, while monitoring behavioural and physiological indicators of their emotional state, the latter could be tested by measuring dog behaviour towards a person after an emotional stimulus [26]. Given that numerous niches already exist for domestic dogs, as do genetically distinct lines, comparative studies could shed light on the factors that lead to, or hinder, the development of empathic skills, and provide information about factors that affect our own emotional/cognitive development. In addition, and given that dogs are argued to show a personality structure similar to humans' [32], it could be interesting to test the effects of individual differences in personality traits on the level of empathy. Studies have shown that some people have greater empathic ability than others [2], but it is yet unknown how differences in attachment style or extraversion/introversion affect

empathy and pro-social behaviour. Also, little is known about the malleability of the mechanisms underlying empathy and it has been questioned whether it could be possible to train people (or dogs?) to become more empathic, and which processing level (emotional or cognitive) should be targeted in order for such a training to be most effective and persistent—all issues that should have considerable implications for education and society as a whole.

Finally, we argue that research on the empathic abilities of dogs is of special importance for decisions about our obligations to them. Dogs have been increasingly involved with human activities and further studies are crucial if specific needs are to be met. For instance, it would be important to conduct rigorous tests on therapeutic dogs that seem to ‘take on’ the emotions of patients, needing massages and calming measures after the sessions (e.g. [33]).

The authors are grateful to Frans de Waal and Katie Hall, as well as to Claudio Tennie, Amrisha Vaish and Atsushi Senju for their valuable suggestions. Also the authors are grateful to three anonymous referees whose comments considerably improved an earlier version of this article.

Karine Silva^{1,2,*} and Liliana de Sousa^{1,2}

¹Departamento de Ciências do Comportamento, Instituto de Ciências Biomédicas Abel Salazar, Largo Professor Abel Salazar, 2, 4099-003 Porto, Portugal

²Ánimas, Avenida Sidónio Pais, 392, r/c Dto., 4100-466 Porto, Portugal

*karine_silva_24@hotmail.com.

- 1 Lipps, T. 1903 Einfühlung, innere Nachahmung und Organempfindung. *Arch. Gesamte Psychol.* **1**, 465–519.
- 2 Decety, J. 2010 To what extent is the experience of empathy mediated by shared neural circuits? *Emot. Rev.* **2**, 204–207. (doi:10.1177/1754073910361981)
- 3 Preston, S. D. & de Waal, F. B. M. 2002 Empathy: its ultimate and proximate bases. *Behav. Brain Sci.* **25**, 1–72. (doi:10.1017/S0140525X02000018)
- 4 Warneken, F., Hare, B., Melis, A. P., Hanus, D. & Tomasello, M. 2007 Spontaneous altruism by chimpanzees and young children. *PLoS Biol.* **5**, 1414–1420. (doi:10.1371/journal.pbio.0050184)
- 5 Langford, D. J., Crager, S. E., Shehzad, Z., Smith, S. B., Sotocinal, S. G., Levenstadt, J. S., Chanda, M. L., Levitin, D. J. & Mogil, J. S. 2006 Social modulation of pain as evidence for empathy in mice. *Science* **312**, 1967–1970. (doi:10.1126/science.1128322)
- 6 Parr, L. A. 2001 Cognitive and physiological markers of emotional awareness in chimpanzees (*Pan troglodytes*). *Anim. Cogn.* **4**, 223–229. (doi:10.1007/s100710100085)
- 7 Davila Ross, M., Menzler, S. & Zimmermann, E. 2008 Rapid facial mimicry in orangutan play. *Biol. Lett.* **4**, 27–30. (doi:10.1098/rsbl.2007.0535)
- 8 Fraser, O. N., Stahl, D. & Aureli, F. 2008 Stress reduction through consolation chimpanzees. *Proc. Natl Acad. Sci. USA* **105**, 8557–8562. (doi:10.1073/pnas.0804141105)
- 9 Fraser, O. N. & Bugnyar, T. 2010 Do ravens show consolation? Responses to distressed others. *PLoS ONE* **5**, e10605. (doi:10.1371/journal.pone.0010605)
- 10 Penn, D. C. & Povinelli, D. J. 2007 On the lack of evidence that non-human animals possess anything remotely resembling a ‘theory of mind’. *Phil. Trans. R. Soc. B* **362**, 731–744. (doi:10.1098/rstb.2006.2023)
- 11 Bekoff, M. 2006 *Animal passions and beastly virtues: reflections on redecorating nature*. Philadelphia, PA: Temple University Press.
- 12 Hare, B. & Tomasello, M. 2005 Human-like social skills in dogs? *Trends Cogn. Sci.* **9**, 339–444. (doi:10.1016/j.tics.2005.07.003)
- 13 Savolainen, P., Zhang, Y., Luo, J., Lundeberg, J. & Leitner, T. 2002 Genetic evidence for an east Asian origin of domestic dogs. *Science* **298**, 1610–1613. (doi:10.1126/science.1073906)
- 14 Cools, A. K. A., Van Hout, A. J. M. & Nelissen, M. H. J. 2008 Canine reconciliation and third-party-initiated postconflict affiliation: do peacemaking social mechanisms in dogs rival those of higher primates? *Ethology* **114**, 53–63. (doi:10.1111/j.1439-0310.2007.01443.x)
- 15 Palagi, E. & Cordoni, G. 2009 Postconflict third-party affiliation in *Canis lupus*: do wolves share similarities with the great apes? *Anim. Behav.* **78**, 979–986. (doi:10.1016/j.anbehav.2009.07.017)
- 16 Hare, B., Rosati, A., Kaminski, J., Brauer, J., Call, J. & Tomasello, M. 2010 The domestication hypothesis for dogs’ skills with human communication: a response to Udell *et al.* (2008) and Wynne *et al.* (2008). *Anim. Behav.* **79**, 1–6. (doi:10.1016/j.anbehav.2009.06.031)
- 17 Wobber, V., Hare, B., Koler-Matznick, J., Wrangham, R. & Tomasello, M. 2009 Breed differences in domestic dogs’ (*Canis familiaris*) comprehension of human communicative signals. *Interact. Stud.* **10**, 206–224. (doi:10.1075/is.10.2.06wob)
- 18 Coren, S. 2004 *How dogs think: understanding the canine mind*. New York, NY: Free Press.
- 19 Jones, A. C. & Josephs, R. A. 2006 Interspecies hormonal interactions between man and the domestic dog (*Canis familiaris*). *Horm. Behav.* **50**, 393–400. (doi:10.1016/j.yhbeh.2006.04.007)
- 20 Joly-Mascheroni, R., Senju, A. & Shepherd, A. J. 2008 Dogs catch human yawns. *Biol. Lett.* **4**, 446–448. (doi:10.1098/rsbl.2008.0333)
- 21 Harr, A. L., Gilbert, V. R. & Phillips, K. A. 2009 Do dogs (*Canis familiaris*) show contagious yawning? *Anim. Cogn.* **12**, 1435–1448. (doi:10.1007/s10071-009-0233-0)
- 22 Platek, S. M., Critton, S. R., Myers, T. E. & Gallup, G. G. 2003 Contagious yawning: the role of self-awareness and mental state attribution. *Cogn. Brain Res.* **17**, 223–227. (doi:10.1016/S0926-6410(03)00109-5)
- 23 de Waal, F. B. M. 2008 Putting the altruism back into altruism: the evolution of empathy. *Annu. Rev. Psychol.* **59**, 279–300. (doi:10.1146/annurev.psych.59.103006.093625)
- 24 Zahn-Waxler, C., Radke-Yarrow, M., Wagner, E. & Chapman, M. 1992 Development of concern for others. *Dev. Psychol.* **28**, 126–136. (doi:10.1037/0012-1649.28.1.126)
- 25 Macpherson, K. & Roberts, W. A. 2006 Do dogs (*Canis familiaris*) seek help in an emergency? *J. Comp. Psychol.* **120**, 113–119. (doi:10.1037/0735-7036.120.2.113)
- 26 Koski, S. E. & Sterck, E. H. M. 2010 Empathic chimpanzees: a proposal of the levels of emotional and cognitive processing in chimpanzee empathy. *Eur. J. Dev. Psychol.* **7**, 38–66. (doi:10.1080/17405620902986991)
- 27 Miklósi, A., Topál, J. & Csányi, V. 2004 Comparative social cognition: what can dogs teach us. *Anim. Behav.* **67**, 995–1004. (doi:10.1016/j.anbehav.2003.10.008)
- 28 Udell, M. A. R. & Wynne, C. D. L. 2008 A review of domestic dogs *Canis familiaris* human-like behaviors: or why behavior analysts should stop worrying and love

- their dogs. *J. Exp. Anal. Behav.* **89**, 247–261. (doi:10.1901/jeab.2008.89-247)
- 29 Miklósi, A., Polgárdi, R., Topál, J. & Csanyi, V. 1998 Use of experimenter-given cues in dogs. *Anim. Cogn.* **1**, 113–121. (doi:10.1007/s100710050016)
- 30 Wynne, C. D. L., Udell, M. A. R. & Lord, K. A. 2008 Ontogeny's impacts on human-dog communication. *Anim. Behav.* **76**, 1–4. (doi:10.1016/j.anbehav.2008.03.010)
- 31 Broom, D. M. 2010 Cognitive ability and awareness in domestic animals and decisions about obligations to animals. *Appl. Anim. Behav. Sci.* **126**, 1–11. (doi:10.1016/j.applanim.2010.05.001)
- 32 Jones, A. C. & Gosling, S. D. 2005 Temperament and personality in dogs (*Canis familiaris*): a review and evaluation of past research. *Appl. Anim. Behav. Sci.* **95**, 1–53. (doi:10.1016/j.applanim.2005.04.008)
- 33 Braun, C., Stangler, T., Narveson, J. & Pettingell, S. 2009 Animal-assisted therapy as a pain relief intervention for children. *Complement. Ther. Clin. Pract.* **15**, 105–109. (doi:10.1016/j.ctcp.2009.02.008)