

Dismantling standard cognitive science: it's time the dog has its day

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Abstract I argue that the standard paradigm for understanding cognition—namely, that thoughts are representational, internal, and propositional—does not account for a large number of genuinely cognitive processes. Instead, if we adopt a more radical approach, one that treats cognition as a cooperative, dynamic, and interactive process, accounting for shared meaning making and embodied thought becomes much more plausible. To support this thesis, rather than turn to the debate as it has been ongoing among philosophers of mind pertaining solely to human thought, I examine our interactions with other animals, and thus, I take a more biological approach to how thought evolves and emerges. Chiefly, I look at the ways in which human-canine interaction (1) ought to count as producing genuinely cognitive phenomena that (2) cannot be properly explicated under a standard model of cognition, and (3) that these sorts of interactive and dynamic pairings between us and our dogs can serve as models for human minds, which I argue are much more shared and cooperative than competing accounts of cognition would have us believe.

Keywords Canine cognition · Cognitive science, embodied cognition · Evolution of thought · Enactivism

For one could easily conceive of a machine that is made in such a way that it utters words, and even that it would utter some words in response to physical actions that cause a change in its organs...But it could not arrange words in different ways to reply to the meaning of everything that is said in its presence, as even the most unintelligent human beings can do...Thus one would discover that they did not act on the basis of knowledge, but merely as a result

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of the disposition of their organs. For whereas reason is a universal instrument that can be used in all kinds of situations, these organs need a specific disposition for every particular action [Descartes, Discourse on Method, Part 5, 40].¹

Introduction

Ever since Descartes concluded that the mind must be an entirely distinct ‘thing’ from the body, philosophers and scientists alike have been forced to reckon with this claim, nowadays mostly rejecting it due to its metaphysically problematic nature. Although the attempted split between mind and body has been widely renounced and replaced by some variant of *physicalism*, there remains a dualism—between human and animal—that has not been as emphatically abandoned, at least not among philosophers of cognitive science. Ethologists, however, have been systematically unraveling this Cartesian paradigm of animals as ‘meat machines.’² Studies indicating that non-human animals have rich and complex cognitive capacities continue to surface.³ As a result, there are some philosophers who are taking notice, and sub-disciplines such as ‘animal studies’ and ‘animal minds’ are emerging and obtaining more respectable places among the ranks of rigorous philosophical investigations.⁴

For the most part, however, philosophers of cognitive science remain a collective of skeptics at best, and naysayers at worst regarding the fruitfulness of studying animal minds. In this paper, I argue that the resistance described here is due in part to an overwhelming loyalty to *Cognitivism*, which has been the undisputed forerunner in theorizing about mentality for quite a while now. An overwhelming reliance on a computational account of the mind is just one reason I will argue that wholehearted allegiance to cognitivism is hindering progress understanding animal cognition, and in particular, in properly assessing the cognitive capabilities the domestic dog. The second and more detrimental feature of this loyalty to cognitivism is that its adherents tend to frame the question of animal minds in an overly anthropocentric manner—that is, they use the human mind as the paragon of thought and then seek to locate identical examples of it in non-human animals. I argue, therefore, that turning our attention instead to the ‘radicals’ of cognitive science will prove to be much more promising.

Emphasizing the embodied, enacted, and extended nature of many cognitive processes, as the ‘radicals’ are known to do, is one half of the case I shall build regarding how to better approach animal cognition, and subsequently rid philosophy of its unnecessary Cartesianism once and for all. The second part of the paper is devoted to exploring a specific non-human thinker—the domestic dog—in order to defend the following claims: first, that cognitivism fails to provide an adequate

¹ Clarke, trans. (1999).

² Cf. Wynne (2004), Weil (2012), Allen and Bekoff (1997).

³ For a nice summary of some of the most recent findings in these regards, cf. Andrews (2014a).

⁴ Cf. Andrews (2014b), Bekoff et al. (2002), Allen and Bekoff (1997), Daston and Mitman (2005).

account of canine cognition, largely because the cognitive framework with which dogs operate is one of *cooperation* with humans and is the result of extensive interactions with us over evolutionary time. Second, and related to my first claim, some of the most fascinating and revealing studies of dog cognition are actually not about dogs themselves so much, but rather, about how dogs think *with us*, and likewise, how we think with them. Hence, by studying dog thinking we are necessarily studying our own minds. This ‘Canine Co-Cognition,’ as I call it, cannot be explicated under a cognitivist paradigm, and is better captured by the ‘Radicalist’ philosophers of cognitive science, especially the enactivists. Thus, treating at least some cognitive processes as *cooperative*—as I argue those occurring between us and our dogs must be—is a story about *human* cognition just as much as it is about non-human.

A caveat before continuing: it will be difficult as we proceed to resist taking an anthropocentric stance on cognition, but doing carries obvious risks of overly anthropomorphizing dog behavior and assuming far too much as to its similitude with human thought. This will be especially difficult considering I have chosen to examine a species whose entire phylogenetic history is inextricably bound up with our own. Nevertheless, it is impossible not to think about thinking *as a human*, and as such, we will always be limited in just how ‘anthropo-neutral’ we can be. I will attempt to navigate this perilous dichotomy by noting carefully what the particular *umwelt*—or ‘lifeworld’—of the dog is and why that ecological niche likely implies a different type of cognitive process. As Horowitz (2010) has argued, canine science needs to be sensitive to the specific *umwelt* of dogs, but it must also recognize that this *umwelt* always already involves human interaction. In line with this tension, therefore, I will discuss at various points throughout the paper what I think are limits to particular studies in terms of extrapolating a ‘canid-centric’ account of cognition. What I hope to convince the reader of in the long run, however, is that these limits apply equally to human cognition. That is, if we are to properly understand our own thinking, at least as it occurs when caught up in interactions with domestic dogs, neither an anthropocentric nor a canid-centric stance will suffice. A *cooperative stance* is needed.

Challenges to the ‘meat machine’ hypothesis

Exactly when humans began to view animals as more than mere fleshy automata, the way Descartes saw them, is tricky to pinpoint, especially considering the likelihood of pre-Cartesian animal minds advocates. *Behaviorism* might be seen as a sort of springboard into current ethological approaches to animal cognition. Indeed, Skinner’s work on operant conditioning shows us that animals—including humans—respond to stimuli in a myriad of complex manners, and that humans, like pigeons, are subject to environmental control and influence. In other words, it’s not that humans are some evolutionary anomaly, imbued with a soul that causes thinking, whereas other animals conspicuously lack this mysterious ghost within their bodies, the way Descartes envisaged it. Rather, *behaviors*, defined as responses to stimuli, vary in degree, not so much based on the type of organism, but with

respect to the varied nature of the stimuli to which that organism is exposed. Thus, all sorts of animals can arguably be said to ‘think,’ according to behaviorists like Skinner, if by ‘think’ you mean exhibit proper responses to environmental changes and stimuli.⁵

Though behaviorism paved the way for dismantling Cartesian thinking about animal automata, most of the studies involved in demonstrating operant conditioning were conducted in laboratory settings, rather than in the actual lived world of the animal. Thus, I see the moment that marks a genuine shift away from Cartesianism being the advent of the science of *Ethology*, co-founded by Karl von Frisch, Konrad Lorenz, and Nikolaas Tinbergen,⁶ which is the study of animals in their natural environments in order to see how they interact, communicate, and perhaps even cognize. It is this last contentious point—that animals *think*, and that we might be able to empirically test and study this phenomenon—that led to what we now know as *Cognitive Ethology*, which is essentially the yoking together of Cognitive Science with Ethology.⁷ It would be naïve, however, to assume that Cognitive Science has univocally cast off its Cartesian allegiances. Cartesianism, it would seem, is difficult to shake off, even for contemporary anti-Cartesians, but cognitive ethology tends to effectively eschew Descartes.

There are innumerable examples of how scientists have purportedly demonstrated non-human animal intelligence. Chimp signing,⁸ bonobo social hierarchies,⁹ elephant self-recognition,¹⁰ dolphin memory¹¹ and even crow facial recognition,¹² are just some of the many abilities non-human animals appear to possess, according to behavioral analysis. Experiments like these all share in common the strategy of seeking out human-like smarts in other species, and some of the findings indicating such smarts exist are indeed compelling. Nevertheless, when we examine such studies with a bit of scrutiny, we might ask questions such as *to what extent is chimp signing an indicator of human-like thinking as opposed to a well-orchestrated trick?* Or, *how likely is it that crows actually remember faces in ways that mirror how the human brain tracks faces?* Thus, it is worth taking such findings with a grain of salt, especially the ones that purport to have found other animals that ‘do it *just like* we do!’.

Besides seeking to find symbolic or representational thought in non-human animals, there has been a recent surge of interest in the emotional lives of animals

⁵ Cf. Skinner (1976). It is also important to note that Skinner does not deny that inner mental states exist—he simply refuses to assign them any causal role in behavior and thus, for him, thought amounts to stimulus—response dynamics, not inner qualia causing outward behavior. Thinking is acting in conjunction with the environment, in other words. Read in this way, Skinner is not so far from some of the claims made by externalists and enactivists.

⁶ Cf. Tinbergen (1963).

⁷ Which was made explicit by Donald Griffin, who argued that such a study would not be simply ethology, but *cognitive* ethology.

⁸ Cf. Fouts and Fouts (1989).

⁹ Cf. Woods (2011).

¹⁰ Cf. Plotnik et al. (2006).

¹¹ Cf. Bruck (2013).

¹² Cr. Marzluff et al. (2010).

and an overwhelming trend to argue that animals have *feelings* just like humans. Braitman's (2014) most recent book, *Animal Madness*, is quite possibly the most comprehensive treatment to date; it deals with animal psychoses, neuroses, joy, love, suffering and the controversial notion that animals can become suicidal. Even more contentious is the argument that animals have morality. Bekoff and Pierce (2009), e.g., argue that observations of animals in the wild demonstrate that they have normative systems of values, rewards, and punishments, and concepts of justice and fairness.¹³

Another intriguing and relatively new trend among these strands of cognitive ethology is a lessening emphasis on species that genetically closest to humans—namely, chimps and bonobos—and a turn instead toward an animal usually overlooked due to its domestication: *canis familiaris*. Hare (2013), e.g., has performed countless studies indicating canine intelligence, including social referencing skills and abstract reasoning abilities. Researchers at the Family Dog Lab¹⁴ have demonstrated similar capacities through experiments geared to test the connectedness between humans and dogs. One might argue here that the sorts of experiments run by Hare and others do not count as 'ethological' in nature; after all, they are often performed in laboratory settings. However, many of the studies, especially those that form part of Hare's *Dognition* games, are set up so as to be performed in the homes of dogs and their guardians. And we must remember that the 'natural habitat' of the family dog is specifically *not* out in 'the wild.' Thus, many of these recent canine cognition experiments are pushing the limits of what it means to do ethological research.

Perhaps these findings regarding dogs would not count as the kind of intelligence Descartes had in mind when he discounted the possibility of 'meat machines' having minds. And perhaps this is why, when searching for this particular mark of cognition—i.e. linguistic aptitude—researchers have tended to focus on chimps or dolphins, because these species do at least behave as if they possess this "universal instrument" of reason.¹⁵ Chimp signing, for example, would likely give Descartes at least some pause for reconsideration of his meat machine manifesto. But even more disturbing for Descartes might be to learn that there *are in fact* examples of dogs who are arguably just as adept with the meanings of words as chimps, dolphins, and 3-year-old toddlers. The now famous Border Collie, Chaser, who seemingly knows the meanings of over 1000 words and can even discern the difference between the way verbs and nouns function in longer sentences, is one of many cases in which researchers are demonstrating abilities in dogs that were once thought only achievable by humans and perhaps apes.¹⁶

¹³ See also de Waal (1996, 2006).

¹⁴ <http://familydogproject.elte.hu/>. See also Miklósi and Topal (2004).

¹⁵ Dolphins, especially as of late, have been demonstrating unique abilities with regards to language. Though contentious in terms of exactly *what* they are doing—merely making associations or actually learning the meanings of symbols—they have been shown to recognize symbols as naming objects, actions to be performed, and even as names for themselves. Cf. de Rohan (2003) and Hamilton (2011).

¹⁶ Although, Chaser was trained for nearly 5 h a day. Also, the question of whether she actually maps words onto objects or is just responding to vocal patterns and extensive training is one that needs to be addressed as well. Pilley and Reid make a strong case that she is actually grasping meaning. E.g., when

This brief survey of the most recent and compelling findings in cognitive ethology is meant simply to highlight a common thread running through much if not all of the field: namely, a dismantling of the Cartesian gulf between ‘us’ and animals. However, a bit of caution in applying this anti-Cartesianism is needed. While animals arguably have mental lives, some of them probably fairly rich, given their complex behaviors, it would be a gross oversimplification to assume that same behaviors equate to same mental states. Even more important is resisting the often overwhelming urge to *anthropomorphize* to the point that we overlook genuine differences or overemphasize similarities such that we mistakenly attribute certain types of thoughts with insufficient evidence or ascribe the wrong types of thoughts.

As I proceed, therefore, I shall keep in mind this tendency to anthropomorphize, and treat it with the skepticism it deserves, although in the end, I will concur with Braitman (2014), who argues that the unavoidable fact that humans think through human frameworks is not necessarily a hindrance to genuine Cognitive Ethology. But first, I want to take a brief detour and examine a paradigm shift occurring in Cognitive Science. This movement away from ‘Standard Cognitive Science’ and toward ‘New Wave’ approaches—what I am calling the ‘Radicals’—is paving the way for many advances in the field, chief among which is a successful approach to studying animal cognition.

Standard cognitive science versus the ‘radicals’

This section is brief and does not do justice to the nuanced differences among the various strands of ‘Standard’ and ‘Radical’ Cognitive Science. That said, there is a view regarding cognition that has overshadowed all others for some time now; namely, that the mind is analogous to a computer. For example, the physical symbol systems (PSS) approach,¹⁷ maintains that the brain operates by receiving data in the form of symbolic input, manipulates these data in the form of internal representations, and then produce a relevant output. Unsurprisingly, this processing mimics the way a computer operates, and as such, PSS guides a large amount of research in Artificial Intelligence.

The umbrella term under which these computational strategies can roughly be placed is called *Cognitivism*. Albeit different in important ways, what unites the various strands of Cognitivism is the idea that cognition is a rational process. Additionally, in a Cognitivist paradigm, the symbolic and linguistic components of thinking are emphasized, and some go so far as to say that *all* cognition is representational. Further still, most Cognitivists argue that cognition is a process that occurs within the confines of a closed physical system, the most obvious choice for such a system being the human brain.

Footnote 16 continued

they introduced a novel toy to her ‘flock’ and assigned a name to it, she was able to infer which toy they were asking for, despite having never seen the toy or heard its name. It is arguably the case that Chaser is doing something similar to what children do as they learn language, though children don’t require the extensive and explicit training Chaser does.

¹⁷ Cf. Newell and Simon (1976).

This last point would make it seem that Cognitivism is a perfect rejection of Cartesianism. After all, the idea that the mind is a physical system is certainly not what Descartes envisaged. However, despite the metaphysical rejection of substance dualism, computational approaches to cognition share more in common with Descartes than a first glance might reveal. Recall, for instance, that the functionalist approach is not concerned so much with the type of system in which cognition inheres, but rather, about the processing itself. It could be that a mental state such as fear is realized by a brain, a computer, or a robotic elephant; so long as the “total states” of each system are functionally equivalent—that is, the inputs, internal computations, and outputs all function the same in the overall system—then we ought not hesitate in claiming that what we are observing is fear in all three cases. When you consider cognition in this way, it begins to seem more like an abstract idea, a process that is not beholden to any one type of physical system. So long as the right sorts of processes align, thinking will occur. Again, this is not Cartesian dualism, not by a long shot, but under a liberally functionalist approach it is not inconceivable to think of cognition as something beyond or over and above the brain. More importantly, Cognitivism shares with Cartesianism what was echoed in the quote that began this paper, namely, that thinking is a rational process. Indeed, rationality is the universal instrument of thought. How else do we go about making decisions, solving problems, and having meaningful conversations?

As compelling as cognitivism can be, it is not without its detractors. Most notably, the claim that cognition is a rationalistic, symbolic, and representational process has come under scrutiny in the last several decades. Similarly, the role of the body and its interaction with an environment has been shown to be much more important than cognitivists would have us believe. Thus, let us consider some of these ‘Radicals.’

Numerous sources could be cited as exemplars of the “New Wave” in cognitive science. I think, however, many of the current trends that go against cognitivism have their roots in a highly influential book: *The Embodied Mind*.¹⁸ In it, Varela, Thompson, and Rosch levy a convincing and potentially detrimental attack on Cognitivism. The conclusion, they argue, is that cognition is an *embodied* practice, not merely an *embrained* one. Taking cues from this *radically embodied thesis*, thinkers have gone on to push even more contentious views, such as the argument that thinking is often not even occurring within a brain or even a body.

Clark and Chalmers (1998), e.g., have claimed that cognition is often distributed among human organisms and the tools they use. That is to say, if I am using my GPS to find my way to a restaurant, the beliefs I form about the restaurant’s location are not entirely in my head, but are rather, spread among my brain and the technology to which I am coupled. Similarly, those who stress the enacted nature of cognition focus on the dynamic coupling of human organism and its environment. Drawing from the work of Gibson (1977, 1986), e.g., enactivists¹⁹ claim that the world affords us with potentials to act and it is in this interplay between brains, bodies, and environment that thought emerges. There are important differences between the

¹⁸ Varela et al. (1992).

¹⁹ Cf. Thompson (2010), Hutto and Myin (2012).

enacted and extended views, but I shall not rehearse those here, as it is irrelevant to my overall argument. What yokes these various pictures of cognition together is that they all describe cognition in terms of rich embodiment and coupling with the environment and argue that thoughtful action occurs in a myriad of ways overlooked by traditional cognitive science.

These recent trends in cognitive science represent what I have been referring to as ‘radical’ stances. They are radical only insofar as they break with the standard, commonly accepted framework for explaining cognition. However, as I have argued elsewhere,²⁰ the radical arguments are really not radical at all—instead, they are the most accurate and explanatorily powerful account of the dynamic and distributed collection of processes we call ‘the mind.’ The debate between the ‘standards’ and the ‘radicals’ is longstanding and complex, and won’t be settled in this paper. That is not my aim here anyways. In suggesting that the radicals might have it right, I am merely asking us to think about what would result if these positions were taken more seriously in cognitive science, and in particular, with regards to non-human animal cognition.

Enactivism makes the point most often that cognition is likely occurring in all sorts of different ways across the animal kingdom. Many enactivists²¹ insist that other forms of life are readily capable of intelligent problem-solving behavior that ought to count as ‘cognitive,’ even if those behaviors don’t smoothly translate into human ones. I will assuredly never know what it’s like to be a bat, but I can appreciate how hearing, instead of sight, might guide my movement. Likewise for other animals; I shall surely never *be* a dog and as such, I will never fully understand the complexity of its olfactory system, but, I can recognize that the olfactory system is a rich source of information for the dog, as rich, probably, as my visual system is for me. The dog’s cognitive niche is shaped by what it smells. In other words, the dog’s nose is part of its cognitive machinery.

Thus enactivists allow for non-human thinking, while also carefully navigating the anthropocentrism issue. We cannot avoid anthropomorphizing entirely. There is no way to think as a non-human. However, we can—indeed we *must*, claims the enactivist—begin to recognize other ways of thinking that might not look anything like what we are accustomed to as humans. This widening of focus also applies to our own cognition. Emotions and social dynamics have long been ignored in the philosophy of mind. Recently, however, and most often among enactivists, more attention has been paid to the ways in which feelings and embodied interactivity shape thought. This interest in emotions and social cognition, along with the general enactivist claim that many life forms besides humans think, are perhaps the most emphatic moves away from Cartesianism thus far. We find a similar shift in focus, it turns out, in cognitive ethology, where emotions and social intelligence are taking more of a central role.

²⁰ Cf. Merritt (2014).

²¹ Cf. Thompson (2010).

Mind, affective and social

A growing number of philosophers and scientists have begun to rethink the role emotions and social interaction play in cognition. Once thought to be of little relevance to a study of the mind, emotions are now seen as necessary constituents of empathy and intersubjectivity, two cornerstones in the development of social cognition. The discovery of the mirror neuron system,²² prompted much debate regarding whether ‘Theory of Mind’²³ has a neurological basis, and more importantly, how integral interaction is to thinking. Gallagher (2008) has argued that our theory of mind stems largely, if not entirely, from interaction. Our primary mode of thinking about other minds, in other words, is through and within an interactive framework.²⁴

Damasio’s (2000, 2005) work has also shifted the focus in neuroscience away from looking solely for brain-based symbol manipulation and rationalistic processes, to the neural correlates of feelings and how they might subtend consciousness itself. Through a careful analysis of many of his patients, Damasio found that despite certain deficits in retention or narrative capacity, the patients retained what he termed a “core self,” even in the absence of a cohesive story or bundle of memories. The limbic system, which processes fear and anticipation of reward, is activated when we try to recall an event or remember a person we love. This activation was still present in patients who had damage to the hippocampus or medial temporal lobe, and could thus not form new autobiographical memories. However, these same patients were able to remember correctly that someone they had met was friendly or rude, even if they could recall no other details about the encounter. The core self, unlike the autobiographical self, Damasio argues, is not subtended by episodic memory, but by the *feelings* generated in interactions—anger, fear, love, etc. The ‘glue’ that holds together this pre-reflective and non-autobiographical sense of self, in other words, is emotion

To many, the claim that animals also lead rich emotional lives is unsurprising,²⁵ though this fact has not been well-documented until recently. In a comprehensive and compelling account of how animals feel both temporary emotions, such as fear or pleasure, and long-term moods like depression, Braitman (2014) argues that we have been overlooking the myriad ways in which animals not only think, but feel in ways just as complex, if not more so, than humans. There is at least some evidence that elephants mourn the loss of family members,²⁶ for instance, and even that parrots can become depressed and potentially suicidal when separated from a close companion.²⁷ Just as humans can have extended moods and emotional ‘personalities,’ so too can our non-human companions possess extended emotions, though

²² Cf. Rizzolatti and Craighero (2004), Arbib (2002).

²³ Term used to depict our general ability to recognize others’ feelings and thoughts despite not having access to the internal works of others’ minds.

²⁴ See also De Jaegher et al. (2010).

²⁵ As is argued by, e.g., Bekoff (2008), and McConnell (2007).

²⁶ Cf. King (2013).

²⁷ See the collection of studies cited in Braitman (2014).

they are likely very different in important ways from our own. By studying the ways other animals behave and interact in the grips of these extended emotional states, Braitman argues, we can learn about our own emotional lives, and in particular, how those feelings are inextricably bound up with and influence thinking.

In the last decade or so, much attention has shifted from apes and dolphins toward the domestic dog, and not because dogs necessarily possess linguistic or symbol-manipulating skills. Instead, domestic dogs have garnered interest because of our unique relationship with them; a relationship that was once a reason to discount them as genuinely worthy of consideration. It turns out, nonetheless, that the companionship we have experienced with dogs for over 10,000 years has resulted in some astounding cognitive developments, both for dogs and for us.

Rather than rehearse all the major studies in the newly formed domain of ‘dognition’,²⁸ I will simply list a few of the most intriguing findings, as they pertain to the discussion thus far regarding emotional and social intelligence.

- Dogs are capable of ‘social referencing’—that is, they follow pointing and even the gaze of humans. Chimps, on the other hand, do not.²⁹
- Humans have a left-gaze bias when assessing other humans’ faces. This is because more of the emotional information in facial expression is found on the right side of the face (hence opposite to our left gaze). With eye-tracking technology, it has been shown that dogs have the exact same left-gaze bias when looking at human faces. They do not have this bias when looking at other dog faces or any other objects.³⁰
- When interacting with your dog, your brain releases the hormone *oxytocin*. This hormone is known as the ‘love hormone’ or the ‘bonding hormone.’ It is present in the brains of women just after they have given birth and when they are breastfeeding their babies. It is also present in any human’s brain when petting their dog. Most astoundingly, it is present in dogs’ brains when they are petted, and even when they are simply looking at us.³¹
- When functional magnetic resonance images are performed on dogs (dogs who have, by the way, been trained to sit still in an fMRI machine while the scan is taking place—a feat never before thought possible and as such, scans could only be performed on sleeping canines), and they smell the sweat of a human, unsurprisingly, the part of their brain that processes smell is activated. When they smell the sweat of their guardian, however, not only is the smell center activated, but so is the part of the brain that recognizes reward. This is the same part of a human’s brain that is activated when anticipating being reunited with a loved one, or when we are engaging in our favorite activities.³²

²⁸ I borrow this term from Brian Hare, who has worked to develop a website devoted to exploring your own dog’s intelligence without having to leave home. Check out the site here: www.dognition.com.

²⁹ Cf. Hare (2013), Hare et al. (1998, 2002).

³⁰ Cf. Racca et al. (2012).

³¹ Hare (2013).

³² Cf. Berns (2013).

There are many more accounts of canine intelligence to list, and like the findings regarding Chaser, discussed in Sect. 2, there might even be reason to believe that dogs *do in fact* possess linguistic and inferential reasoning skills. I have listed these particular findings above because they are precisely *not* stories about the supposed rational, linguistic, and logical capacities of canines. Instead, taken together, these aforementioned studies indicate a different sort of intelligence from the type Descartes so venerated, but intelligence all the same. Much as with humans, the role of emotion and social referencing should not be ignored. Indeed, it is this ability to read facial expressions and follow gaze and pointing that provides the foundation for language and culture in the infant human. Thus, as John Pilley, the owner of Chaser has argued, we ought to start thinking of our dogs as toddlers, rather than as pets.³³ While I tend to agree with Pilley here, especially considering my own interactions with the various dogs and toddlers in my life, I do want to caution against accepting his analogy entirely. There are similarities between dogs and babies to be sure—much like I cannot quite comprehend what is going through the mind of a pre-verbal child as she plays in a world of her own imaginative creation, I also don't fully grasp what is going on when my Border Collie stares for hours on end at the cat. A key difference remains, however: the pre-verbal toddler is assuredly on her way to full-blown adult linguistic aptitude, while my dog is not. Thus, to claim a dog and a toddler are entirely on par with each other is (1) an oversimplification and (2) over-anthropomorphism.

Despite these concerns, it seems clear that humans share with dogs in that a computationalist framework does not suffice to explain our minds—we are also embodied, emotional, social and interactive. Or, to put it differently, rationality is not an isolated process—it is subtended by a variety of other processes, and most importantly, it is shaped by our interactions with and among our particular physical and social environments. We can see this connection between feelings, thoughts, and environment most assuredly when we examine canine cognition. 'Intelligence' amounts to a lot more than symbol manipulation and linguistic representation, especially for dogs. When we look for these other modes of thought, such as emotional cognition or interactive social thinking, in the rest of the animal kingdom, rather than come up short, as Descartes claimed we should, we are faced with an embarrassment of riches.

I have chosen to focus on dogs here, not just because of their unique social referencing and emotional capacities, but also because I think the minds of dogs have shaped our own human minds in unique and ultimately positive ways. One of these fruitful alterations comes in the form of reconceiving the very definition of thought. In other words, I am arguing that examining the way dogs think, and more importantly, how they think *with us*, forces us to change some of our fundamentally held ideologies about the human mind and how it works. Not only does the interactive process between dogs and humans highlight the ways in which thinking is a lot more social and emotional than we might have ever imagined, but dogs have also been shaping us as a species. Contrary to long-held assumptions that humans

³³ Quoted during a 60 min interview. Watch here: <http://www.cbsnews.com/news/the-smartest-dog-in-the-world>. See also Pilley and Reid (2011).

domesticated dogs in a purposeful and targeted way, the new and more convincing evolutionary theory is that wolves self-domesticated due to scarcity of food and, strangely, competition with the only other alpha hunter around: us.³⁴ As Shipman (2015) has argued, rather than try to defeat us, wolves began to work with us, scavenging food we left behind, slowly learning to be friendlier and friendlier, though not so friendly as to turn into dinner themselves, and eventually, hunting alongside us. Our very survival as a species, we might say, depended on our canine friends, and theirs was highly dependent on ours.³⁵ Taking these points about the co-constitution and co-evolution of humans and dogs, in the final section, I shall discuss what I have termed “Canine Co-Cognition,” and how this enactivist-based dual-partner type of thinking should once and for all dismantle standard cognitive science and its lingering attachment to Cartesianism.

Cognition as a cooperative process

In Sect. 4, I argued that ‘dog smarts’ force us to expand the limits of what counts as ‘intelligent cognition’ insofar as the way dogs think does not fit neatly within a cognitivist framework. Dogs think in a uniquely canine way, and the studies I have mentioned regarding their cognitive abilities, in my opinion, have done well to respect that distinction between ‘us’ and ‘them.’ In other words, it is not an egregious anthropomorphism, if, upon finding that dogs have similar neurobiological processes when interacting with us as we do when interacting with them, we conclude that they are experiencing something similar to us. Just as behavior and physiology guide ethological studies of wild and captive animals, so too can we observe dog behavior and dog physiology and draw modest conclusions about the functioning and reasoning mind the dog might possess. Again, however, dog thinking is just that—thinking *qua dog*—and as such, to over import our ideas or terminology into the story, would be to tread too deeply in anthropocentric waters. Appreciating the specific lifeworld of a dog is key, I think, to approaching an understanding of its specific dog mind.

There is a further consideration that I will argue demonstrates just how different canine minds must be from our own, and hence, why we must continue to avoid overly liberal anthropomorphism. What I shall discuss, however, also points to an inextricable link between the mind of a human and the mind of a dog, and thus, the impossibility we face trying to study dog minds in complete isolation. Instead, I urge that we begin labeling the cognitive studies surrounding dogs as “Canine Co-Cognition.” This is because from the beginning—and I mean from the beginning of the species *canis familiaris* itself—dogs have responded *to*, learned *from*, and thought *with* their human companions. Indeed, it was this cooperative relationship that transformed some wolves into the loyal companions sitting at many of our feet

³⁴ Cf. Coppinger and Coppinger (2001).

³⁵ Shipman and his sympathizers also claim that the very reason Neanderthals did not survive but Homo Sapiens did, is because of the supreme hunting skills possessed by the latter. And it wasn’t about tool use, unless we want to go so far as to call dogs ‘tools.’ Neanderthals made tools and weapons. What they failed to do was become intertwined with canids.

today. This transformative relationship, I will further argue, is bidirectional. As much humans worked to shape the wolf-become-dog mind, so too did this relationship change us, as it continues to do so today.

To understand what Canine Co-Cognition is supposed to be, it is helpful to turn back to Sect. 3, where the ‘radicals’ of cognitive science were discussed. Specifically, the enactivist view, which claims that cognition is often if not always better conceived as a dynamically coupled process, fits especially well with the picture of dog minds I am sketching. Within an enactivist framework, certain cognitive processes are argued to emerge from organism-environment interactions, but are not reducible back down to either one of those constituents. As a very simple example, take reading a book. The cognitive act of reading—comprehending text as the visual system scans over it, and forming ideas of what one is reading—is clearly not possible without the environmental ‘prop’, be it a book or e-reader, etc. The enactivist will not necessarily go so far as to say that reading itself is actually occurring outside of the organism,³⁶ but the idea is that the coupling of the reader to what is being read constitutes the process. Take away the book, and obviously there is no reading. But the reading doesn’t occur *in the book* either. Rather, it emerges through the interaction of the human and the book. There are countless other examples of how this enacted view of cognition works, but I want to turn to one in particular that highlights the type of enacted “dognition” I think best suits understanding how dogs think with us.

De Jaegher and Di Paolo (2007) describe an enactivist phenomenon they refer to as “Participatory Sense Making” (PSM), in order to explain how meaningful thought emerges not just from organism-environment interactions, but also from organism-organism interactions. Emphasizing intentional movement, which expresses willful agency without the need of explicit linguistic representation, De Jaegher and Di Paolo argue that meaning can be generated among two or more ‘partners’ in ways that escape traditional cognitivist explanations. Take, for example, Currie’s (2007) description of a couple that has just arrived at their honeymoon suite. One of them might audibly sigh whilst looking out from her newly acquired hotel balcony—a sigh that signals approval and contentment, but one that simultaneously elicits a response from her partner, who is also in the room. Her overtly perceptible reaction is a communicative act insofar as she is attempting to convey meaning—to highlight a part of the world she is experiencing with another, and to check to see if this person shares the same understanding of the experience. The orientee—her partner—does not attempt to uncover her intentions as a detached third-person observer; rather, through coordination and modulation of meaning-making activities, the intentions become readily apparent without the need for theorizing, simulating, or thinking *about* the other in an explicitly linguistic manner.

Given the above example, it is easy to envisage all sorts of other interactions that would count as genuinely cognitive, but non-representational, non-linguistic, and

³⁶ Though some will (cf. Noë 2009). It depends on the particular flavor of enactivism being argued. As I have stated, there are very nuanced debates even among those claiming to be enactivists, but this need not concern us here.

most importantly, irreducible to one partner in a constituent pair. All sorts of findings in developmental psychology are suggestive of PSM. Joint attention in parent-infant interactions,³⁷ using emotional cues as factors in decision-making,³⁸ and coordinated movements leading to discoveries and shared meaning,³⁹ to name just a few, all bolster the ideas put forth by enactivists like De Jaegher and Di Paolo. I have argued (2013) that certain forms of dancing—in particular, contact improvisation—also demonstrate the role movement plays in thought and how when, say, constructing a meaningful piece of art with another, it is actually *unhelpful* to rely on an internalist, representationalist, and/or linguistic strategy. Another arena in which I think PSM is absolutely applicable is in characterizing the ways in which dogs think. This is because dogs almost always think *with us*.

Haraway (2008) has recently described our relationship with dogs in a way that mirrors the enactive view of cognition generally insofar as she claims that dog–human coupling constitutes a unique mode of thought, one that emerges in the here-and-now interactions between us and our canine companions. Focusing on the sport of agility, she argues that this activity, in particular, highlights the irreducibility of thought to either of its component parts. To the unfamiliar reader, agility involves a person-dog pair whereby the dog is cued to run through a predetermined series of obstacles—including hoop jumps, teeter totters, tunnels, and weave poles—and often, though not always, the dog who is able to complete the course the fastest, wins. The shared meaning between my dog and I as we navigate an obstacle course, as Haraway describes it, is a genuine communicative act, but one that no linguistic or representational account of cognition could properly capture. This is because though I might speak to my dog—commands like “weave!” or “chute!”—the bulk of the communication is going on non-verbally. Hand cues are very important, as are head nods, and my overall posture. More importantly, I am fairly certain my dog does not understand much English, other than the few words he has learned to associate with various actions. Yet, the fact that I can simply nod in the direction of a tunnel and he runs through it, pops out on the other side, donning what seems to be the biggest dog grin ever, eyes intently staring into my own, as if to say, *I did good, right?*, makes it pretty difficult to deny that communication is taking place. However, if I were to assume he understood the course in the exact same way I did—what the word ‘chute’ represents, how faster equals better, rewards, disqualifications, etc.—then I would be going too far. Here is an example of how I can appreciate the unique *umwelt* of my dog and how vastly different it is from my own, despite being on *the same course*. He is poised differently, on four legs, is using his nose more than I could ever imagine, sees the world at about a third of my height, and likely in different hues, and does not grasp all the symbolic referents in this shared space to which I am privy.

Nevertheless, despite living in different *umwelts* within the same physical world, my dog and I, in this moment working through an agility course, are also not entirely distinct and incomprehensible to each other. To relate all of this back to

³⁷ Cf. Seeman (2012).

³⁸ Cf. Tollefson (2005).

³⁹ Cf. Gilbert (1990).

PSM, agility creates a domain of shared meaning—I would go so far as to call it social sensemaking—in which understanding is generated by interactions. My dog and I are thinking through the obstacle course together, such that our shared meaning is irreducible to either one of us alone. Much like when I consult my GPS for directions and the belief I form about my intended destination is constituted by the coupling of me and my tool, so too is this special form of thinking that exists between my dog and me.

While the sport of agility provides an excellent case of human–dog PSM, we need not confine ourselves to such a specialized activity with which not everyone is familiar. Instead, Canine Co-Cognition occurs among even the most seemingly mundane of human–dog interactions. Hare's (2013), studies, e.g., show that dogs use social referencing to extract meaning from us, as the pointing and gaze following experiments mentioned earlier indicate. Thus, every time you glance out the window expectantly and your dog follows along, perhaps growling or perking up its ears, you and your dog are participating in shared meaning-making. Likewise, as Berns (2013), and others have been showing, simply looking into our eyes is a mode of communication for our dogs; it is often a way of “hugging us with their eyes,” as Hare describes it.⁴⁰ And of course, as many dog trainers will tell you, along with researchers like Horowitz (2010), the way humans carry themselves—on walks with their dogs, around the house, around others—is of utmost importance for the dog's comprehension of what we are thinking. Braitman's (2014) ground-breaking book on animal psychoses and emotions is perhaps most telling in this regard; our dogs literally sense when we are sad or angry or happy. They can see it on our faces, hear it in our voices, smell it in our changing pheromones, and feel it in the way we move.⁴¹

What about our ability to ‘read’ dogs? Surely we risk over-anthropomorphizing if we immediately assume that a wagging tail indicates happiness or that alert eyes and ears means excitement. Indeed, we ought to be careful in how much human-like feeling and thought we import into our descriptions of dogs' minds. Adopting an enactivist framework, however, I do not think the risk of unhelpful anthropomorphism is so great. That is to say, if we treat dog cognition as co-constituted with human thought and behavior, then, on the one hand, it would be unhelpful *not* to retain and at least some human-centered ideas pertaining to thought—after all, we are half of the story. On the other hand, we are *just half* of the story; we must also describe and explain the interactions between humans and dogs, and moreover,

⁴⁰ See the interview as part of the same 60 minutes segment mentioned in footnote 26.

⁴¹ I realize I am taking a lot of liberties here, mostly due to space limitations. Do dogs really ‘comprehend’ what we are thinking? Or do they merely observe behaviors and make predictions as to what actions will be next, what they should do next in anticipation, etc? Then again, perhaps this is all we do as humans. Dogs probably don't have a concept of hugging, so it is a bit presumptuous of Hare, e.g., to claim they ‘hug us with their eyes.’ Again, anthropomorphism is hard to escape, even for trained scientists. But I do think there is something to be said for the immediate access with which dogs seem to have to our feelings, often on a physiological level that we as humans cannot comprehend. Does this immediate access count as a form of Direct Perception (assuming the arguments for direct perception in humans have any merit)? I think this particular paragraph points toward the need for much more discussion on several of these issues, many of which return us to some fundamental tensions in the philosophy of mind and social cognition.

appreciate the unique *umwelt* and cognitive architecture of the dog, if we are to successfully navigate the canine mind. Now that we are equipped with growing scientific research indicating that humans and dogs do in fact possess many of the same neural processes in response to similar stimuli and hormonal reactions within our blood, it is not an overzealous move to claim that a lot of what goes on ‘in our minds’ is similar to what goes on with our dogs. Of course, to put words to many of these interactions would be to already shuffle the story too far over in the direction of human-centered cognition. Then again, our means of communication are limited and until now, we have only learned to speak ‘human.’ It seems, however, that if there is a chance to learn a new language, to ‘speak dog,’ as it were, a good place to start might be the motto, *talk less and play more*.

Conclusion: A new companion in cognitive science

What is truly unique and special about the dog–human relationship is that it opens up a space to learn about both partners equally. To be sure, we are uncovering more and more about the canine mind, and I think that if we adopt the strategy I’ve argued for in this paper, even more progress will be made. However, it is also the case that Canine Co-Cognition a story about us—humans—just as much as it is about our dogs. That a dog can read emotions off of the face of its guardian might not seem all that profound. Indeed, I already know if I am sad—the dog is simply recognizing this fact. But is it always the case that we ‘know ourselves’ as well as we think we do? I can think of several times in which I was experiencing severe anxiety, but was unaware precisely why my stomach hurt and why things just seemed ‘off.’ My dog, however, seemed to sense it much earlier—pacing around, avoiding making eye contact with me, refusing to eat. This is an anecdotal case, no doubt, but studies are emerging that indicate dogs might have an edge when it comes to understanding and even predicting human thoughts, feelings, and physiology.

It has been long established that some dogs can predict seizures in patients prone to them.⁴² More recently, dogs have been shown to be able to detect cancer in humans, simply by smelling urine sample.⁴³ These are examples of physiological capacities dogs possess that until now, in order to master the same feats, humans have needed to rely upon technological innovation. These abilities are not really examples of dogs ‘reading our minds,’ but they might be part of a more general faculty dogs have evolved to possess, something like an ‘understand all things human module.’⁴⁴ The fact that so many dogs are being brought into hospice facilities, hospitals, therapy sessions, and even study sessions for students⁴⁵

⁴² Cf. Howbert et al. (2014).

⁴³ Cf. Willis et al. (2004).

⁴⁴ By ‘module’ I am not at all taking a stance on the modularity issue. Perhaps learning is more domain-general, and perhaps dogs’ minds are better characterized in a non-modular way. I merely use the word here to depict a capacity that is demonstrably quite specialized in dogs.

⁴⁵ See this write up covering several institutions that have added dogs to campus to help students cope with college stress. http://www.huffingtonpost.com/2012/05/12/colleges-turn-to-dogs-to-help-finals-stress_n_1512156.html.

indicates that they have a knack for helping us through nearly all stages of life. And they do so without saying a word. Dogs just seem to *get us*. There are obvious evolutionary advantages to this adaptation, for the dog, indeed, but for humans as well. Learning to read each other was essential for *our* survival. Today, this ability is helping us forge better relationships with our dogs, as well as with other animals. Though the law views dogs as property, this is actually an improvement from only a few decades ago when they were less legally significant than a toaster.⁴⁶ Changes like this have far-reaching consequences, well beyond the laboratory. Rethinking policies regarding treatment of all sorts of animals already has and will continue to result if we continue to improve our understanding of companion species such as dogs. Undoubtedly, these positive changes are beneficial to the non-human animals, who cannot speak for themselves, but they are also beneficial to humanity in the long run. In the drive to better understand human cognition, which, I have argued includes our relationship with each other and the environment, we can learn a great deal from our non-human animal friends, especially the ones already living in our homes.

To close, I think it fitting to revisit the quote at the beginning of this paper, and consider how the humanities as a discipline would alter, were we to finally and once and for all disburden ourselves of the Cartesian paradigm. What I have argued about Canine Co-Cognition reshapes not just how we look at dogs, but how we look at ourselves as ‘thinking things.’ But it is precisely in examining the interactions we have with our canine companions that we are forced to rethink what *thinking* is. Sure, thinking means willing, affirming, denying, doubting, and occasionally being rational, as Descartes would have it, but it also means having emotions, reading social cues from others, including non-humans, and engaging in non-linguistic, yet genuinely intelligent conversations with our animal companions.

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⁴⁶ The history of the legal standing of animals is covered quite comprehensively in Grimm’s (2014) *Citizen Canine*.

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