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Enactivism, pragmatism…behaviorism?

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Abstract Shaun Gallagher applies enactivist thinking to a staggeringly wide range of topics in philosophy of mind and cognitive science, even venturing into the realms of biological anthropology. One prominent point Gallagher makes that the holistic approach of enactivism makes it less amenable to scientific investigation than the cognitivist framework it seeks to replace, and should be seen as a "philosophy of nature" rather than a scientific research program. Gallagher also gives truth to the saying that "if you want new ideas, read old books", showing how the insights of the American pragmatists, particularly Dewey and Mead, offer a variety of resources and tools that can be brought to bear on modern day enactivism. Here, I suggest that the adoption of enactivist thinking would undermine the assumptions of certain scientific positions, requiring their abandonment, rather than simply making it more difficult to conduct research within an enactivist framework. I then discuss how Mead's work has been used previously as a "pragmatist intervention" to help resolve problems in a related 4E endeavour, Gibson's ecological psychology, and make a case for the inclusion of radical behaviorism as another pragmatist resource for 4E cognition. I conclude with a plea for further enactivist intervention in studies of comparative cognition.

Keywords Enactivism · Evolutionary psychology · Mead · Radical behaviorism · Theory of mind · Ape cognition

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1 Enactivism and evolution

Gallagher (2017) stages a number of "enactivist interventions" designed to show that, contrary to popular belief, the mind is not exclusively in the head, and that a computational–representational theory of mind is "not the only game in town" as some would have it (Gallistel and King 2009). Taking on everything from intentionality to free will to the cognitive consequences of standing upright, Gallagher shows how an enactivist view, one that considers the cognitive system to consist of brain–body–environment, with an emphasis on action, provides a more convincing account than the standard representational alternative.

One potential downside of this more holistic view is that enactivism may not be as amenable to scientific investigation as the view it aims to replace. For this reason, Gallagher suggests that enactivism could be seen more as a "philosophy of nature" than a scientific research program. I would also suggest that, in some cases, an enactivist view is unlikely to be taken up because it undermines key assumptions of particular scientific theories, rather than because it is intrinsically harder to conduct scientific research within an enactivist framework. Derksen (2007), for example, offers a critique of a number of schools of thought in evolutionary psychology, in which the main thrust of his argument is that, without exception, none make room for human agency. In the case of classic work in evolutionary psychology, like that championed by Tooby and Cosmides (1992), and the gene-culture co-evolutionary theory of Boyd and Richerson (1985), the human mind is seen as a "conduit": a channel that links biology and culture without the mind itself being affected by our sociocultural practices. In the case of theorists such as Plotkin (2002) and niche construction advocates, like Laland et al. (2000), Derksen (2007) shows that, although the mind is seen as more than a conduit, culture is theorised solely as information in people's brains, with no consideration of material culture and how this feeds back and influences our cognition; objects and artifacts are only ever products of culture, never part of culture itself, and certainly not part of an extended mind (something that remains true of more recent work: e.g., Henrich 2015). In all these evolutionary theories, then, the human mind is only ever viewed as an 'intermediary' between biology and culture. In contrast, Derksen (2007) argues for more emphasis on the human mind as a 'mediator', with greater attention paid to the ways that humans intervene actively in biological and cultural processes. To this end, Derksen uses Latour's (1993, 1994) actor-network theory to show that human life consists of dense networks of human and non-human actors and, via a process of psychotechnical self-cultivation, we give rise to ourselves as bio-cultural hybrids—novel new events in the world, not simply passive blends of nature and culture.

Following Gallagher's (2017) lead, it is apparent that enactivist intervention would also be fitting here, in the form of Dewey's notion of the situation, along with Dewey's and Mead's evolutionarily-grounded recognition that "[a]gents are inclined to use whatever is available to solve survival problems, and this extends to 'apparatus and appliances of all kinds'" (Gallagher 2017, p. 53). The concept of the situation arises "when the coupling of the organism–environment…starts to break down", which calls for "a kind of re-pairing, a reestablishment of a workable

coupling" (Gallagher 2017, p. 53). Consequently, "cognition, in such cases, is a form of inquiry, understood as a hands-on practical activity through which we transform the problematic situation into one that is less confused and more comprehensible, and where ideas for successful action start to emerge" (Gallagher 2017, p. 55). Most critically, the situation is constituted by the organism–environment, and hence "already includes the agent or experiencing subject…[a]ccordingly, the trick to solving a problematic situation is not simply to arrange the objects in the environment but to rearrange oneself as well—to make adjustments to one's own behaviors. Indeed, any adjustment one makes to objects, artifacts, tools, practices, social relations, or institutions is equally an adjustment of oneself" (Gallagher 2017, p. 55). Gallagher (2017) thus offers Derksen (2007) an equivalent set of tools to develop his notion of mediation, with the added benefit of a firm evolutionary foundation. Furthermore, Derksen's (2007) conclusion that humans "cultivate their nature" as an ongoing and inherently political process is also entirely in tune with Dewey's writing on psychology as a moral science, concerned with matters of human flourishing (e.g., Dewey 1900; see also Brinkmann 2004 for an interesting discussion on this issue).

Evolutionary psychologists, however, have apparently resisted arguments like Derksen's (2007), or perhaps it would be more accurate to say they have simply ignored them, as they have ignored previous philosophical work in this area (e.g., Wheeler and Clark 2008). The reason for this, I submit, is not simply that holistic enactivist research is more difficult—as both Sterelny (2012) and Malafouris (2013) demonstrate, it is entirely possible to include cultural artifacts in a scientific program of research into the roots of human cognition, and to emphasize active agency in evolutionary models. Rather, an acceptance of enactivism undercuts a key assumption of the most prominent school of thought in evolutionary psychology: namely, that the human mind consists of a number of specialised adaptations evolved in response to recurrent problems faced in ancestral environments. In this view, the environment is merely the source of the inputs on which our evolved adaptations get to work, producing behavioral outputs that, although they no longer function adaptively in the modern day, nevertheless reveal the structure of our cognitive architecture. This assumption licences the study of human minds in isolation from their environments precisely because the environment has no intrinsic role to play with respect to cognition but is merely the stage on which the products of our evolved cognitive mechanisms play out. Accepting that (1) the basic unit of analysis should be the organism–environment complex, (2) that we are an integral component of the situations in which we find ourselves, and (3) that behavior falls out of the non-linear interactions (or transactions) between brain, body and environment, means accepting that current behavior cannot provide a window through which the structure of our ancient cognitive mechanisms can be seen. Accepting enactivism is, therefore, fatal to this particular instantiation of the evolutionary psychology project.

2 Earlier enactivist–pragmatist interventions

Enactive evolutionary psychology is, of course, another matter. Peirce, James, Dewey and Mead were all pioneers of an evolutionarily-informed psychology and, as Gallagher (2017) illustrates, an extended and enactive philosophy of mind. The inclusion of Mead here is particularly cheering as he receives far too little attention, especially in 4E circles, despite producing a well worked out non-mentalistic scientific theory of human psychology that encompasses both evolutionary and developmental processes (Mead 1934). As Baldwin (1988) suggests, Mead's neglect may reflect misinterpretation by sociologists, like Herbert Blumer, who used Mead's work on mind and self to generate a mentalistic model human action. Gallagher's (2017) intervention may thus help (re)establish Mead as a vital theorist in the 4E world, one who illustrates the means by which we can approach subjects like mind, self and agency scientifically and not only philosophically. Gallagher's (2017) inclusion of Mead's work also reminded me of an earlier intervention where pragmatist thinking—and Mead's ideas in particular—were used to resolve a lingering dualism in Gibson's ecological psychology and the notion of affordances (Gibson 1979).

Although Gibson emphasized that affordances "cut across the dichotomy of subjective–objective" (Gibson 1979, p. 129), pointing to both the observer and the environment simultaneously, there is some inconsistency and ambiguity in Gibson's writing: he often seems to regard forms and objects as inhering independently in the world, even though these should be seen as environmental features that entail the presence of a perceiving organism (Noble 1981). As Noble (1981) sees it, Gibson's distaste for idealism, combined with a neglect of pragmatist thinking, left him with no means to account for an organism's own role in creating its experiences in the non-mentalistic terms he required. Despite his recognition that an organism's activity was vital to an account of experience, he didn't take the next (pragmatist, enactivist) step, and recognise that a focus on the act itself could help explain the generation of a perceptually experienced world (Noble 1981). As a result, Gibson was constantly thrown back on a naïve realism as the only means by which he could avoid invoking the subject–object/organism–environment dualisms he had taken such pains to dissolve. Noble (1981) shows how Mead's (1934, 1938) focus on what the organism is doing, and not simply what the environment affords can be used to solve this problem. In Mead's pragmatic account, meaning is realised in practice: objects in the environment do not pre-exist but are realized by our actions on them—they are "collapsed acts". Thus, although the "surfaces" of the environment exist independently of humans, such surfaces only become "objects" in virtue of the fact that they are handled, manipulated and transformed. All objects are therefore "in some sense hypothetical until we get them into the manipulatory field and complete the act which the distance experience initiates" (Mead 1938, p. 151).

Similarly, Costall (1995) uses pragmatist thinking to deal with another ambiguity in Gibson's work, pointing out that, although Gibson's theory aimed at eradicating the dualism between organism and environment, he nevertheless created two other dualisms: those between the "natural" biological world, and the "artificial" social

world of humans, and between "the neutral world of surfaces and a meaningful world of things" (Costall 1995, p. 470). In his later writings, Gibson dissolved the distinction between the "artificial" and the "natural", arguing that "It is a mistake to separate the natural from the artificial as if there were two environments: artifacts have to be manufactured from natural substances. It is also a mistake to separate the cultural environment from the natural environment as if there were a world of mental products distinct from the world of material products. There is only one world, however diverse, and all animals live in it, although we humans have altered it to suit ourselves." (Gibson 1979, p. 150).

Although apparently resolving the dualism in his early writing, Costall (1995) argues that Gibson fails to recognize that human artifacts possess a special psychological status relative to natural objects and their affordances differ accordingly. More recently, Costall (2012) has suggested that Gibson confused what Costall terms the "canonical affordances" of human artifacts (the conventional, normative meaning of things) with affordances in general. Costall (1995, 2012) does not mention Mead by name, referring only to pragmatist and functionalist thinking, but Mead's influence is apparent in the suggestion that, to fully dissolve this lurking dualism in Gibson's work, we need to recognise that affordances are, for humans, social in far-reaching ways. Affordances do not just exist relative to us, but also *relate* to us in anthropomorphic terms: a particular kind of door handle is designed to 'invite' pushing versus pulling, whereas the spiky tops of a row of railings 'threaten' us (Costall 1995). Affordances are also deeply social for humans because our developmental experience is one of being "introduced" to the many and various artifacts in our environment: affordances are learned from others, and not merely discovered from scratch individually. Our objects are shaped, and sometimes expressly designed, by the intentional activities of other people, and they relate to (often highly specific) cultural practices—there is an established, widely agreed "use-meaning" of things, such that affordances are often mediated by social structures that are not connected to their visible properties (Costall 2012). As a result, the affordances of human artifacts cannot be understood in terms of the individual-object dyad, but only within the kind of wider social, symbolically significant framework that Mead articulated so clearly in his work—although we may stand on a chair to reach a high shelf, or lie under it when playing hide-and-seek, chairs are *for* sitting.

Noble (1981, pp. 72, 73) also registers Gibson's conflation of socially-mediated "canonical" affordances with affordances in general, and again draws on Mead's work on language, mind and self to suggest that Gibson failed to recognise that "the kinds of social organisation and "cooperation at a distance" that language permits is entailed in the investment of this [object] as a special device that has one special function and no other" (Noble 1981, p. 73). As Mead himself said "while in a perceptual world the ultimate test is the handling of what we see, we stop short of this in most tests of the reality of things. We depend upon the substantive meanings of what we see, that is, upon the *universalized social responses*, which implicate experimental data but do not demand them" (Mead 1938, p. 151, emphasis mine). In a standard, representational "spectator" theory of knowledge, the fact that our environment comes to be known via a process of socio-cultural mediation is taken

as evidence that some form of barrier exists between the social world and the 'real' world of objects (Costall 1995). In the action-oriented pragmatist–enactivist perspective, socio-cultural mediation is intrinsic to the very process of knowing because, as Mead argued (1934), the environment as encountered is already a fundamentally social reality. Thus, as Gallagher (2017, p. 48) suggests there are "resources in pragmatism that can allow us to develop a more integrated perspective" not only with respect to enactivist and extended mind views, but also other perspectives within the 4E framework, like ecological psychology.

3 Mead, Skinner, behaviorism and enactivism

Another reason why the inclusion of Mead is so cheering is because, if one admits the importance of Mead, as Gallagher does, then we can also welcome B.F. Skinner into the enactivist fold. This suggestion may seem odd, if not downright perverse, given that enactivist positions are often criticized and dismissed because they look like "behaviorism again" (e.g., Block 2005; Aizawa 2015, 2017). But behaviorism takes many forms, and Skinner's radical behaviorism, rooted as it in in pragmatist thinking and with striking similarities to Mead's social behaviorism, does not fall foul of the standard criticisms, which are either criticizing something else entirely (usually Watsonian behaviorism) or else are dependent on the acceptance of particular assumptions and principles of the cognitivist framework. While this is not the place for a full-on defence of Skinner's philosophy (but see Barrett 2012, 2015 and Myin and Barrett, in prep.), nor a detailed comparison of Mead and Skinner (see Baldwin 1988 for this kind of review), it seems worthwhile to highlight the similarity in their thinking, as a means to illustrate the benefits to be had if enactivism began to view radical behaviorism as a source of inspiration and cooperation, rather than a spent force. In brief, both Mead and Skinner shared a focus on historically situated activity-in-context, rejected reflexive stimulus–response formulations of behavior, advanced probabilistic notions of prediction and control, and they applied a behaviorist analysis to complex issues like problem-solving, the self, creative thinking and the production of novel behavior (Baldwin 1988). Perhaps most notably, they took similar positions on inner events and consciousness (Baldwin 1988). Indeed, their statements on the matter are often near identical. Compare Mead's (1934) views on Watson's "methodological behaviorism" with those of Skinner (1969):

> It is not possible to deny the existence of mind or consciousness or mental phenomena, nor is it desirable to do so; but it is possible to account for them or deal with them in behavioristic terms which are precisely similar to those which Watson employs in dealing with non-mental phenomena.
>
> Mead (1934, p. 10).

> The charge is justified that [methodological behaviorists] have neglected the fruits of consciousness. The strategy is, however, quite unwise. It is particularly important that a science of behavior face the problem of privacy. It may do so without abandoning the basic position of behaviorism…An

> adequate science of behavior must consider events taking place within the skin of the organism, not as physiological mediators of behavior, but as part of behavior itself…The skin is not that important a boundary. Private and public events have the same kinds of physical dimensions.
>
> Skinner (1969, p. 227).

As Baldwin (1988) notes, variation in Mead's and Skinner's positions mainly reflects the fact that Skinner had a larger, more recent body of empirical work to draw on, allowing him to provide more precise theories concerning how particular kinds of natural and social contingencies led to the acquisition or modification of particular behaviors—another reason to include Skinner along with Mead as a pragmatist with resources to offer enactivism. Indeed, Baldwin identifies only one issue on which Mead and Skinner truly differ, that of determinism. Although both offered probabilistic theories of behavior, and rejected the idea that metaphysical certainty about free will and determinism was possible, Mead argued we should only ever expect probabilistic theories due to the emergence of unpredictable events, whereas Skinner was more of a methodological determinist, happy to accept determinism as a working hypothesis. Skinner also developed a style of "interpretive analysis", where he often wrote as if a fully deterministic science of behavior were possible (both Verbal Behavior (Skinner 1957) and Beyond Freedom and Dignity (Skinner 1972) are these kinds of interpretive exercises). In Skinner's (1973, p. 261) view, interpretation was "not science as such, but it is not metaphysics either". It was, however, precisely these interpretative exercises that led many to criticize and reject behaviorism as an extreme scientific position. Emphasizing the links between Mead's and Skinner's work, as well as demonstrating via Mead that behaviorism can and does embrace probabilistic indeterminate models, may help persuade enactivists that radical behaviorism is nothing to be afraid of, and need no longer be used to "scare little children in the existentialist dark" (Bergman 1962, p. 674). The fact that Skinner was also one of very few scientists to explicitly recognize that science itself is a human activity ("Science *is* human behavior, and so is opposition to science": Skinner 1972, p. 27), and that scientists form an inherent part of the situations in which they find themselves (Skinner 1956), should also entitle him to some enactivist love.

4 Enactivist intervention and animal cognition

In closing, I would just like to suggest one more area in need of enactivist intervention: comparative psychology. Specifically, enactivist thinking usefully can be applied to studies of social cognition in non-human primates and other species, particularly those aimed at determining whether these animals possess a "theory of mind" (ToM). This work is grounded in computational–representational theories of mind, and takes it as axiomatic that there is a "hidden" mind that sits behind behavior and gives it meaning, such that understanding others requires inferences from bare, bodily movements to internal psychological states.

From an enactivist perspective, there are several problems with this formulation, as Gallagher (2017) discusses in his chapter on intentionality. Even taken on

their own terms, however, studies of animal mentalizing are problematic because the scientists who conduct tests in this way are not, in fact, doing what they claim to be doing—that is, determining whether animals possess cognitive mechanisms that enable other animals to mentally represent the mental representations of others, or whether they are only capable of mentally representing their behavioral states. Instead, such studies often pit folk psychological mentalisitic concepts (e.g., "apes really do know what others do and do not see": Tomasello and Call (2006, p. 371)) against more mechanistic alternatives. As Penn (2011) argues, this is actually a strongly anti-cognitivist position: mentalistic interpretations are presented as alternatives to computational or algorithmic mechanisms, when they are really just short-hand folk psychological re-descriptions *of* such mechanisms (see also Barrett 2017, 2018).

This confusion then contributes to a second one known as the "logical problem" or "Povinelli's problem": because human mentalizing abilities have been built on top of, and integrated into, an ape-level ability to represent and read behavior, it is impossible to determine, on the basis of non-verbal experimental evidence alone, whether a human being is using a behavior-reading mechanism or a mentalizing mechanism to solve a task, and so the same must be true of, say, a chimpanzee: both mechanisms predict the use of observable behavioral cues and, as such, they cannot be distinguished from each other (Povinelli et al. 2000; Povinelli and Vonk 2004). Thus, for any mentalistic hypothesis, there is a complementary behavior-reading hypothesis that can explain the data equally well (Lurz 2009).

This problem is seen as presenting a purely empirical challenge: to design an experiment that can demonstrate that a target animal is reasoning about mental states, while simultaneously ruling out the possibility that the observable behavior alone could explain the target animal's response. Efforts to have achieve this have involved designs where some form of behavior (often that of a human experimenter) is held constant during a critical phase of the experiment. Under such conditions, it is argued, the animal would have to reason about the human's internal beliefs, goals or intentions to succeed, as the behavior itself does not vary. For example, Buttelmann et al. (2012) investigated whether chimpanzees could use context to infer a potential change in a human experimenter's goals (see Barrett 2018 for more detailed discussion). Chimpanzees learned that they would be fed from two feeding stations positioned on either side of two adjoining enclosures. In baseline trials, an experimenter would offer grapes from one feeding station, then move over to the other and continue feeding from there. When the experimenter rose from her stool at feeding station A, the chimpanzees learned to anticipate that she would be moving to feeding station B, and would travel from one enclosure to the other, positioning themselves at the second feeding station.

Experimental trials were similar in structure to baseline trials, except that an external event was introduced, which terminated the feeding at location A. In one condition, a walkie-talkie that had been placed on the floor near station B would receive an incoming call. In a second condition, the experimenter would call out for a clipboard, which would be thrown into the room landing near station B. In a third condition, someone would call the first experimenter by name and beckon her outside. In each case, the experimenter would respond identically up to a given

point, and then vary her behavior depending on the condition (i.e., she would pick up the walkie-talkie; she would pick up the clipboard; she would leave the room). Buttelmann et al. (2012) reasoned that, as the experimenter's behavior was identical up to a certain critical point, a chimpanzee that could only read behavior would not recognize that the experimenter's goal (of feeding grapes from station B) had changed due to the external event, and would proceed straight to station B as usual. In contrast, a chimpanzee capable of attributing internal intentions would hesitate because they would infer that the experimenter's goal was now related to the external event, and not to the usual switch between feeding stations. The results showed that chimpanzees hesitated around 2 s longer on average in experimental trials compared to either the baseline trials or to control trials, during which the experimenter herself deliberately dropped a clipboard onto the floor, before standing and proceeding to station B. The authors thus concluded that the chimpanzees were making their decision on the basis of understanding the experimenter's goals, and not simply responding to concurrent cues.

My objection here should be obvious: we are being asked to accept that a non-mentalizing animal would somehow fail to register any other difference between baseline and experimental conditions, other than the contingencies between the experimenter, the buckets and her movements. Moreover, the authors also argued that, as the chimpanzee's behavior differed between the control and the experimental 'clipboard' condition, the contextual feature of "clipboard on the ground" could not have been used as a discriminative stimulus. If it had, the chimpanzees' behavior would then have been the same in the two conditions. In other words, the authors are arguing that a chimpanzee would not register any difference between a person throwing a clipboard down beside them, and another person throwing it into the room from outside.

As argued in more detail elsewhere (Barrett 2018), it is not the mentalizing hypothesis that is outlandish here, but the behavior-reading one, for it treats a non-theory-of-minded animal as entirely "mind-blind": animals lacking the ability to attribute mental states in the "scientific" manner required by proponents of ToM are presumed to see others only in terms of the colourless movements of limbs and other body parts. The behavior-reading hypothesis also assumes that non-Theory of Minded animals perceive only the most shallow surface features of the world (e.g., "clipboard on the floor"), rather than a richly detailed sequences of events and interactions, in which their own actions play a role.

It should thus be abundantly clear why enactivist intervention is needed: to rectify the mistaken impression that to lack a "scientific" theory of mind is to lack any kind of mind or mentality at all. As Gallagher (2017) argues "we perceive another's intentionality in the form of operative intentionality rather than infer or simulate mental act intentionality" (p. 77), where such "operative intentionality is intrinsic to movement; it is in one's actions, in one's environmentally attuned responses" (p. 80) such that "our understanding of others is pragmatic and it references their action in context: it is not indexed to Cartesian mental states that would explain their actions". (p. 77). Or as Peter Hacker puts it: "…behavior is grasped as animate—as the behavior of a living animal. It is perceived as a

manifestation or expression of cognitive, cogitative, affective and volitional powers, and is so described" (Hacker 2013, p. 89).

The caricatured version of behaviorism used in these studies also helps to explain the first confusion identified above, where folk psychological redescriptions are mistaken for cognitive explanations. Take Steven Pinker, for example, who asks: "How might we explain why Rex just walked over to the phone? We would not say that phone-shaped stimuli caused Rex's limbs to move in certain arcs" (Pinker 2003, p. 32). Indeed we would not, and nor would any self-respecting radical behaviorist or enactivist. Pinker (2003, p. 32) then offers that: "we might say that he wanted to speak to his friend Cecile and knew that Cecile was home. No explanation has as much predictive power as that one". But this provides no explanation whatsoever in terms of the internal, computational mechanisms that produced Rex's behavior, which is what Pinker claims the computational theory of mind alone can provide. It only seems to offer this kind of explanation because it is couched in our ordinary folk psychological language, and this captures the intentionality we see manifest in behavior—what Gallagher (2017, p. 64) describes as an "embodied form of transaction with the environment", an intentionality that is "visible in our actions and our environmentally attuned responses". This embodied intentionality is then mistakenly attributed to the inferential and inductive processes that the current scientific picture argues to be responsible for these abilities. This embodied story can be absorbed into the computational account so easily because the behaviorist alternative is constructed so as to exclude any possible suggestion that intentionality might be manifest in behavior. Similarly, when other animals respond to, and interact appropriately with, each other in experiments like the one described above, this is taken to be evidence for mentalistic inferential processes because the only other option is to see "limbs moving in certain arcs".

It should now be apparent that Povinelli's problem cannot be solved empirically: it is an impossible problem and can only be dissolved by enactivist intervention (or Wittgensteinian conceptual investigation, which perhaps amounts to the same thing: Moyal-Sharrock 2013; Barrett 2018). The idea that we can pull behavior and mind apart via clever experimentation is nonsensical, as is the notion that genuine knowledge of others requires possession of a specific theory about other's invisible mental states. As Gallagher (2017) notes, "the latter seems to be what we appreciate when we try to explain or predict others' behaviors from a detached observational standpoint, or reflect upon others' behaviors rather than when we enactively engage with their intentional behavior" (p. 78). What seems to have happened in studies of comparative cognition is that this reflective, third-person perspective, which we are obliged to use when studying other species scientifically, has been projected directly onto the animals themselves, as though they too will use a third-person perspective when directly engaging with their conspecifics. In this way, ape (monkey, dolphin, raven…) knowledge becomes Cartesian, propositional, third-party knowledge, because it is, in fact, our own scientific knowledge reflected back at us. We badly need an enactvist intervention so that we can see more clearly that "participants don't need theories" (Reddy and Morris 2004) and that "intentionality means we are in the world, distributed over brain–body–environment and extended in pragmatic and communicative practices" (Gallagher 2017).

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