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Consciousness and Cognition

journal homepage: www.elsevier.com/locate/concog

Action understanding: How low can you go?

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ARTICLE INFO

Article history:

Available online xxxx

Keywords:

Mirror neurons
Action understanding
Folk psychology
Theory of mind
Mindreading
Enactivism

ABSTRACT

This paper begins by reminding the reader of the standard arguments that sceptics offer for doubting that mirror neurons could constitute any kind of action understanding (Section 2). It then outlines the usual response to these sceptical worries made by believers (Section 3). An attempt to put flesh on this idea in terms of what brains understand is critically examined and found wanting (Section 4). The ensuing analysis shows that it is *prima facie* possible to develop a more tenable account of enactive understanding that would fit the bill (Section 5). However, a second look raises further questions about (A) what mirror neurons target and (B) what such targeting involves (Section 6). Finally it is concluded that while mirror neurons may play a central role in enabling non-mentalistic forms of intersubjective engagement this falls short of action understanding (Section 7).

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1. Introduction

First discovered exactly two decades ago, mirror neurons continue to inspire debate about what function, if any, they might play in social cognition. Literally thousands of papers have devoted speculation to this and related topics in the wave of research in social neuroscience and philosophy of mind that followed in the wake of Gallese and Goldman's (1998) seminal opinion piece. That paper asked, for the first time, if a possible function of mirror neurons might be to "detect certain mental states of observed conspecifics... as part of, or a precursor to, a more general mind reading ability" (p. 494).

Years later the focus has shifted. Hence, the question this paper investigates is slightly updated. It asks: Might mirror neuron activity – in its own right – suffice for *any* kind of action understanding? There are two clearly divided camps of opinion about how this question is to be answered on the current scene. For convenience, let us call these two camps *the sceptics* – who say 'No', and *the believers*, who say 'Yes'.

Importantly, the difference of opinion separating sceptics and believers over how to answer the question is not rooted in disagreements about the neuroscientific or empirical details about what mirror neurons do or how they do it. Mirror neurons have a unique kind of dual functionality; they fire both when certain end-directed doings of conspecifics are perceived (visually or audibly) and when a perceived observer engages in the same type of activity (Gallese, Fadiga, et al., 1996). Mirror neurons are sensitive to more than the mere kinematic features of simple movements, if movement is narrowly defined as mere changes in a body part's position. Mirror neurons are selectively sensitive to something more than this – they target doings that are embedded in wider chains of coordinated activity (e.g., reaching, grasping, bringing to the mouth) and that are in the service of particular ends (e.g., eating vs. placing) (Fogassi, Ferrari, et al., 2005).

Mirror neurons are 'set up to be set off' by such activity and are so in ways that abstract from the specific modality or particular means of achieving a given end. Thus they fire whether the relevant doings are seen (Umiltà, Kohler, et al., 2001) or heard (Kohler, Keysers, et al., 2002) or, indeed, even if the motor activity required for achieving a particular end

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involves non-standard sequences of movements (Rochat, Caruana, et al., 2010). This establishes that whatever it is that mirror neurons do they are not mere movement detectors.

Both sides in this debate concede this much. Inspired by these findings the believers advance the view that the activity of mirror neurons, by itself, enables or suffices for an understanding of (1) motor acts; (2) *why* a motor act is done (the goal of the action of which the motor act is part); (3) the intention behind observed motor acts (Fabbri-Destro & Rizzolatti, 2008, see also Becchio, Manera, Sartori, Cavallo, & Castiello, 2012).¹ Some believers have even gone so far as to claim that “the *primary function* of [mirror neuron] matching is to enable us to immediately understand the meaning of the actions performed by others” (Sinigaglia, 2008, pp. 19–20, emphasis added. See also Rizzolatti & Sinigaglia, 2006, p. 124). Sceptics deny all such claims.

In what follows, I begin by briefly reminding the reader of the standard arguments that the sceptics offer for doubting that mirror neurons could suffice for or constitute *any* kind of action understanding (Section 2). I then outline the usual response to these sceptical worries made by the believers, a response which stresses that sceptics have overlooked the possibility of a non-folk psychological kind of action understanding (Section 3). Rizzolatti and Sinigaglia’s (2006) attempt to put flesh on this idea in terms of what brains understand is then critically examined and found wanting (Section 4). The ensuing analysis shows that, with some important adjustments, it is *prima facie* possible to develop a more tenable account of enactive understanding that would fit the bill and serve the believers needs (Section 5). However, a second look raises further questions about (A) what mirror neurons target and (B) what doing so involves (Section 6). And, finally, worries about what embodied understanding might mean completely scupper the credibility of the believers’ reply. It is concluded that while mirror neurons may play a central role in enabling non-mentalistic forms of intersubjective engagement that this falls short of action understanding, strictly understood (Section 7).

2. The sceptics

Sceptics doubt that – whatever else they may do for social cognition, whatever part they might play in enabling it – the kinds of responses to others that mirror neuron activity engenders does not by itself suffice for any kind of action understanding. A number of recent papers conclude this (Borg, 2007; Goldman, 2009; Jacob, 2008). The general consensus amongst sceptics is that mirror neuron activity might play a restricted role in enabling or prompting action understanding but that mirror neuron activity, by itself, cannot suffice for any kind of action understanding. For example, sceptics allow that it is possible that mirror neuron activity might play a part in detecting target behaviours for the attention of mindreading devices, while insisting that action understanding only occurs with the latter capacities are brought to bear. If so mirroring processes might, at most, play a causal role in helping to prompt action understanding by initiating or triggering *bona fide* mentalizing activity but without qualifying as sufficing for such understanding.

The arguments for this sceptical verdict share a common form. They start by assuming that action understanding necessarily involves making mentalistic attributions of contentful attitudes of some kind – i.e. beliefs, desires or their analogues. It is then argued that mirror neuron activity does not – by itself – suffice for *any kind* of action understanding because such activity lacks some or other aspect that is required for attributing contentful mental states. Thus it is concluded that mirror neuron activity – in lacking the relevant features – necessarily falls short of what is required for action understanding proper.

Borg (2007) highlights that even if, thanks to mirror neuron activity, one’s own motor system is naturally sensitive to another’s dispositions to behave in specific ways (for example firing reliably when another picks up a cup and moves it to their lips to drink) that this falls manifestly short of intentional attribution. And this is primarily because, as we learned long ago, there is no way credible way to “move between descriptions of behaviour and claims about mental states” (p. 17). This is the gist of her complaint against the believers.

In a similar vein Jacob (2008) argues that neural resonance is not sufficient for divining intentions understood as propositional attitudes or combinations thereof.² He holds that while mirroring based on neural resonance might succeed in replicating the content of another’s motor intention, in order to do their work the content of motor intentions is necessarily too-fine grained (indeed nonconceptual) to qualify as action-guiding intentional content. This is established by the fact that motor intentions (should there be such things) stand in a one-to-many relation even to the most basic goals and intentions of the sort associated with action-sponsoring propositional attitudes. Jacob (2008) illustrates this indeterminacy worry nicely with the following example:

In grasping the red apple with her right hand, was the agent’s goal to eat it? To give it to her little daughter? To throw it away? Or to display it in order to draw it? I can mentally rehearse her reach-to-grasp movement: this might enable me to know what it is like for the agent to grasp and feel the apple within the palm of her right hand. As this example illustrates, the notion of a goal is more abstract than the notion of a target (Jacob, 2008, p. 205).

¹ Fleshed out with an example, the claim is that “There are two distinct series of information that one can get observing an action done by another individual. One is “what” the actor is doing; the other is “why” the actor is doing it. If we see, for example, a girl grasping an apple, we understand that she is grasping an object. Often, we can also understand, in addition, why she is doing it, that is we can understand her intention. We can infer if she is grasping the apple for eating it, or for putting it into a basket” (Fabbri-Destro & Rizzolatti, 2008, p. 2055).

² In an earlier publication Jeannerod and Jacob (2005) argued that mirror neuron activity is not necessary for action understanding, based on the work Heider and Simmel (1944).

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