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Update Article

Understanding intentional actions from observers' viewpoints: A social neuroscience perspective

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ABSTRACT

When we see others, we also try to 'see' their unobservable states of minds, such as beliefs, desires, and intentions. We carefully monitor others' actions, as we assume that those actions are outward manifestations of their internal states. Actors and observers can have divergent views on the cause of the same actions. Critically, it is often the observers' view that affects important decisions in social life, from deciding the optimal level of cooperation to judging moral responsibility and court's decisions. Thus, the judgment about intentionality and agency in others' actions determines the way in which the observer deals with the actor. The primate brain has two separate neural systems that function in understanding others' actions and intentions. The mirror system is activated by others' visible actions and predicts their physical consequences in goal terms, whereas the mentalizing system is primarily involved in the prediction of others' intentions and upcoming actions regardless of whether others' actions are directly observable or not. The functional roles of the two systems have sometimes been described as mutually independent or even oppositional. I propose a hypothesis that the two systems may collaborate closely for judging the sense of other-agency.

1. Introduction: people are sensitive to others' minds

Imagine for a moment that you are looking at someone making an oral presentation at a neuroscience meeting. At a glance, the talk is superb: it is nicely organized and delivered fluently, and its scientific content attracts much attention. You nevertheless come to feel that the talk lacks a certain something. You have noticed that the speaker is exactly reading from a script with his eyes constantly looking down at it. Why can't you be satisfied with the talk? What could be wrong with it? If the purpose of conference presentations is to convey scientific findings as precisely as possible, the talk should be fully satisfactory. What would you expect to find more in his talk?

It is often said that people do not like merely being read to in a presentation. Why do they feel so? Perhaps it is because people not only want to learn about new findings from the talk, but are also interested in knowing about the speaker's intention, desire, and passion. People assume that the speaker is not just moving his mouth or vocal cord but is also moving his mind. People assume that the actions of others are outward manifestations of their unobservable internal states. Reading from a script is very much akin to visually triggered movements in laboratory tasks, as opposed to internally generated ones that we expect to see in social agents. People can hardly figure out what the speaker is like from such a presentation no different from playing back an audiotaped voice.

This example points to the human disposition to be sensitive to and make inferences about the mental states behind others' actions. Such inferences are ubiquitous in everyday life and affect our social decisions profoundly. In this opinion-like article, I address several questions about others' actions and intentions in social settings, which are central to social neuroscience. How can actors and observers have different views on the intention of the same action and why do observers' viewpoints often matter in social life? Under what conditions do we perceive intentionality in others' actions? Who exactly are others? That is, under what conditions do we construe particular targets as social agents while other targets as nonsocial objects? How does the brain work in understanding others' actions and intentions? To answer these questions, I review relevant literature from a broad range of disciplines. Finally, I propose a speculative model that may account for a neural mechanism underlying the judgment about the sense of other-agency.

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2. Actors and observers: divergent views on the same action

Ordinary people generally believe that human decisions and actions are not governed by deterministic laws, that is, every event that happens is an inevitable consequence of prior conditions and natural laws. In one experiment (Nichols and Knobe, 2007), undergraduate students were given a description of two different universes. In Universe A, every decision is completely caused by what happed before the decision (determinist universe). Thus, given the past, each decision has to happen the way that it does. In Universe B, decisions are not completely caused by the past, and each human decision does not have to happen the way that it does (indeterministic universe). After reading this description, nearly all participants (over 90%) answered that the indeterministic universe is most consistent with their own. This finding suggests that adult people accept the idea that at the moment of making a decision, it is genuinely possible to freely choose one way or the other. This indeterministic bias, or a free will bias, appears to exist already during early childhood. In another experiment (Nichols, 2004), 3- to 6-year-old children observed an experimenter perform a simple action, such as putting her hand in a box, or an object moving likewise, such as a ball falling into the box. The children were then asked whether the person/object had to behave as it did, or whether it could have done something else instead. The vast majority of children reported that the *person* could have done something else. Most children denied, however, that the *object* could have done something else. These experiments support the idea that both actors and observers inherently have an indeterministic interpretation of their own actions and others' actions, respectively.

It is also known, however, that actors tend to explain their own actions differently from the way observers would explain those actions. Specifically, actors often view their own actions as caused by situational constraints or requirements, whereas observers tend to view the same actions as caused by those others' internal and stable dispositions (Jones and Nisbett, 1971; Pronin, 2008). These divergent views on the cause of the same action become even conspicuous when negative events or outcomes happen (Malle and Knobe, 1997). A good example is a person arriving late for a job interview and ascribing that lateness to bad traffic while his interviewer attributed it to personal irresponsibility (Pronin, 2008). The actor-observer asymmetry may arise from differences in knowledge and motivation between actors and observers. Namely, actors have far more information about his own circumstances, history, motives, and experiences (Jones and Nisbett, 1971; Pronin, 2008). Such asymmetry can also be explained by the differential focus of attention when perceiving self versus others. For the observer, others' actions are figural against the background of the situation. For the actor, the situational cues are figural and are seen to elicit actions (Jones and Nisbett, 1971). This difference might be associated with the fact that people are much less capable of seeing themselves and their entire actions.

3. Feeling intentionality: observers' views matter

The arguments above support the notion that humans have indeterministic views on the course of actions. Moreover, actions are more readily seen by the observer to be a manifestation of internal dispositions of the actor. Work in developmental psychology has shown that it is from infancy onwards that we process observed actions in intentional terms and distinguish between intentional actions and nonintentional or accidental actions (Baldwin and Baird, 2001; Carpenter et al., 1998; Meltzoff, 1995; Miller and Aloise, 1989; Mull and Evans, 2010; Olineck and Poulin-Dubois, 2009; Rosset, 2008; Smith, 1978; Tomasello et al., 2005). Some researchers hypothesize that when seeing human actions, children may automatically activate a 'default' explanatory bias that they are intentionally driven and it is only through experience with nonintentional/accidental actions that they learn to override such default interpretation (Rosset and Rottman, 2014). Similarly to human infants, nonhuman primates such as orangutans and chimpanzees distinguish intentional actions from accidental ones, at least in some occasions (Call and Tomasello, 1998).

The distinction between intentional and accidental actions is not a trivial matter. Rather, it is a crucial component of social interaction and system (Malle and Knobe, 1997). For example, if considered as intentional on the part of the observer, be it actually accidental or innocent on the part of the actor, a critical remark can be seen as a hurtful insult, a collision in the hallway can be taken as a provocative act, and line cutting can result in a shouting match. The same argument is also applied to the judgment of harassment at work (e.g., power, sexual, and academic). Most crucially, the law system relies on this concept in the distinction between intentional murder and manslaughter. The concept of intentionality spreads into every corner of social life. The perception and judgment of intentionality on the part of the observer is a key determinant in many social decisions.

Some actions appear to be more readily considered as intentional by observers. It has been shown that the folk concept of intentionality is made up of five factors (Malle and Knobe, 1997): i.e., the presence of desire, belief, intention, skill, and awareness. Others' actions are viewed as intentional when observers have reasons to assume that actors have a desire (for an outcome), appropriate beliefs (about how the act would lead to that outcome), intentions (or will as a direct cause of the act), skill (to perform the act particularly when it is dexterous or complex), and awareness (of fulfilling the intentions while performing the act). However, the focus of that study was entirely at the explicit (verbal) level of action understanding. As seen in infants and nonhuman primates, intentionality judgments are not always performed at the explicit level.

Wegner (2003) proposes, on the part of the actor, that our experience of the conscious will to act occurs in accordance with principles of priority, consistency, and exclusivity. Specifically, for a given action to be perceived as caused by our own will, a thought should occur before the action (priority), the action and its outcome should be consistent with the prior thought (consistency), and the thought should not be accompanied by any other potential causes of action (exclusivity). Importantly, the principles of causal inference do not describe actual causal relations. For example, people will think that they have caused actions intentionally when a thought relevant to the action is experimentally manipulated to emerge just before (1–5 s), but not after, the action, regardless of whether they actually performed the action or not (Wegner and Wheatley, 1999). Although Wegner's principles have been originally developed to account for the actor's experience of the conscious will to act, they may also hold for the perception of that act in others. That is, when (i) an observer expects that another individual would make a certain action (priority), (ii) the observed action and its outcome are consistent with the prior expectation (consistency), and (iii) there are no other potential causes of the action (exclusivity), the observer would regard the action as intentionally caused by the actor. As will be discussed later, these principles may be associated with the sense of other-agency, i.e., the feeling that others are in control of the observed actions, as well as the feeling that it is the others' actions that have caused the observed consequences.

4. What are *others*?

The perception of intentionality in others' actions lies at the core of social cognition and is a key factor when making many