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Understanding infants' understanding of intentions: Two problems of interpretation[☆]

The article by Kiraly and colleagues (henceforth KJPAG) is an important contribution to an age-old debate: what can a person know about another person's mind, and on what grounds can he or she know it? KJPAG focus this question on the initial character of infants' understanding of intentional actions and the course and causes of the development of that understanding. Any approach to these questions necessarily rests on (1) assumptions used to pose the questions and (2) the kinds of evidence deemed relevant to answering them. KJPAG raise interpretive problems within each of these issues.

The first issue concerns the bases on which people—in particular, infants—interpret observed actions as intentional. KJPAG analyze the structure of teleological causality as a three term relation among behavior, goal, and situation. Next, they propose criteria to define the forms of the three-term relations that will count as teleological (the 'rationality principle'). From these criteria, they derive necessary and jointly sufficient 'cues' for identifying particular instances of observed behavior as purposeful. On this account, infants are born not just with the capacity for intentional understanding but also with concrete specifications for the surface appearance of behaviors that are to count as intentional. Infants are presumed to attribute intentionality indiscriminately to any behavior that matches the specified cues.

We believe that this framework rests on a faulty analysis of teleological causation that distorts the intentional understanding of both adults and infants. We recommend an alternative analysis that enables scientists to account for the nuances of teleological understanding: Wimsatt (1972) analyzes purposeful behavior as behavior for which the purpose explains the existence and/or form of the behavior. He then demonstrates how a purpose can achieve this causal force through the operation of selection processes. On his account, teleological understanding is conditioned not only on the relevant behavior, purpose, and environment, but also on, for example, the perceiver's (folk or explicit) background theory and perspective on the system in question. Wimsatt explicitly demonstrates how his analysis accords with pertinent commonsense and philosophical intuitions.¹

This alternative analysis highlights two difficulties with KJPAG's theoretical framework. First, KJPAG analyze teleology in terms of *rationality* rather than in terms of *selection processes*. Their framework reduces intentionality to rationality (thereby conflating 'irrational' actions with

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¹ This analysis invokes the same mechanism (selection) that guides action development (Bertenthal & Clifton, 1998) and is also consistent with the 'Common Coding Approach.'

‘unintentional’ actions) and further reduces rationality to ‘efficiency.’ While we agree that an agent must necessarily select one of several possible ways to achieve a goal, it seems unlikely that people are compelled only and always to interpret intentional agents as rational; rather, we believe that people can consider multiple bases on which an agent might choose a particular course.

The second difficulty with KJPAG’s theoretical framework is their attempt to use their analysis of teleology as a premise for deducing which observed behaviors are to count as intentional. In reality, no rigid set of cues can adequately distinguish intentional actions from non-intentional behaviors, nor can it reflect the flexible and nuanced ways adults construe the purposes guiding behavior. Consequently, KJPAG’s framework systematically distorts what counts as intentional—for theorists, lay adults, and infants alike. From this vantage point, the process of development looks strange indeed: infants would begin life with an interpretive system whose proper functioning leads them seriously and systematically astray. Rather, we propose that infants come to identify purposeful actions by means of a variety of experiences, including their own experiences as agents, and possibly the kinds of information cited by KJPAG (equifinality and salient changes in state). Such information is understood not as terms of an innate algorithm but as contributing to infants’ informed interpretations.

The second interpretative issue concerns the problem of inferring infants’ understanding of observed events from their patterns of visual attention. Looking time paradigms are invaluable because they are one of the few methods available to infancy researchers. However, drawing sound conclusions from these paradigms is complex. There are many reasons why infants might systematically look longer at one event as opposed to another. Because of this, it is almost never possible to draw strong conclusions from a single experimental condition. This concern is commonly addressed through carefully constructed control conditions.

To illustrate, in our research, after discovering that infants looked longer at ‘new goal’ than ‘old goal’ grasping events, we tested infants in control conditions designed to evaluate whether this result was due to extraneous factors such as how the events entrained infants’ attention to the objects or patterns of change in low-level features (as suggested in KJPAG, note 5). Our control conditions have included events that paralleled the grasp condition but replaced the grasping hand with: a rod, a mechanical claw, a pointing hand, and contact with the back of a hand (Woodward & Guajardo, 2002; Woodward, 1998, 1999). While each of these conditions were equivalent in how they entrained infants’ attention and altered featural configurations, only a subset of them (grasping and, for older infants, and pointing) yielded selective responding to ‘new goal’ trials. Therefore, we could conclude that the grasping results were not driven by these extraneous factors.

We are encouraged that KJPAG advocate using these kinds of controls, but we have serious concerns about how they implement this strategy. As KJPAG note, their study contained a confound, namely, that only one of the toys moved, and therefore the ‘new goal’ object was also the ‘newly mobile’ object. They cite an unpublished study as a control for this confound because it found that infants did not look longer at the ‘new goal’ events when a mechanical claw was used to move the objects. This logic replicates the logic we have used in our own work. Unfortunately, in this case the claw study fails to provide the necessary control for KJPAG’s findings, since it is reported to have been performed at an age (6 months) at which KJPAG did not find the experimental effect.

This problem highlights the need for thoughtfully controlled designs in order to interpret looking time data. We worry that without attention to this issue, researchers run the risk of

treating a single condition as a measure of goal attribution in infants, when only a constellation of conditions can begin to support this kind of conclusion. It is particularly important to consider this issue at this point because, as is clear from KJPAG's discussion, many new findings are now emerging.

In conclusion, the article by Kiraly and colleagues raises concerns at two levels of interpretation: (1) when and how infants (as well as adults) construe other people's observed behavior as organized by a particular intention, and (2) when and how scientists can legitimately construe infants' observed behavior as organized by an attribution of intentionality. The answers put forth to each of these questions confront symmetrical problems: just as infants would be significantly misled by relying on necessary and sufficient cues for identifying intentional action, so scientists would be equally misled by relying on experimental results without appropriate controls. Rather, both infants and scientists must rely on nuanced, informed judgment. There is no such thing as a simple 'intentionality meter'—either for infants or for scientists.

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Jessica Heineman-Pieper
Amanda Woodward
Department of Psychology
University of Chicago
5848 South University Avenue
IL 60637 Chicago, USA
E-mail address: woodward@uchicago.edu