



COMMENTARY

Diagnosing goal-attribution: commentary on Hernik and Southgate

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This is a commentary on Hernik and Southgate (2012).

Do 9-month-old infants construe the direct reach and grasp of a single object, sitting alone on a table, as a goal-directed action? Based on their current findings and a previous study (Bíró, Verschuur & Coenen, 2011), Hernik and Southgate (this issue) make the rather surprising suggestion that infants do not make this attribution. Here, we present a concern with this conclusion, specifically, that infants' goal-attribution in one-object events was never actually tested.

After infants observe an actor repeatedly grasp an object presented alone, they do not look longer at an event in which a new object, now incorporated into the scene, is grasped, as compared to an event in which the old object is grasped (e.g. Bíró *et al.*, 2011; Luo & Baillargeon, 2005, with 'animated' boxes). That is, the infants do not show, as Hernik and Southgate call it, the 'Woodward-effect' (after the experimental design of Woodward, 1998, in which two objects were always present). The authors propose that performance in these one-object experiments, and their own control conditions, 'reflected a failure to attribute any goal in the first place', referring to the initial interpretation of a grasp or approach toward a singly presented object. Using the Woodward-effect as a diagnostic tool for goal-attribution, the authors subsequently show a looking time difference in test trials after the addition of a motion pattern proposed to be integral for goal-attribution, rational efficient motion around a barrier, suggesting that its absence in the previous one-object studies rendered goal-attribution unlikely.

To be sure, the experimental design created by Woodward (e.g. 1998) is exemplary. Results have been replicated across laboratories, using all types of 'agents' (e.g. humans, real world and computer animated moving boxes and shapes). However, the reliance on the Woodward-effect as a standard of infant goal-attribution might be muddying the research waters, in this paper particularly. Simply put, the Woodward-effect can only be found when an infant observes a goal-directed action *and* encodes, for example, a grasped object as a special

object – one that will likely be acted on again, in a new context in which it is paired with a new object. This *is* 'goal-attribution', but looking time patterns that do not show the Woodward-effect do not necessarily indicate that infants did not see an action as goal-directed. A direct grasp or approach to a single object may, for example, be interpreted as goal-directed, yet not in a manner that allows for the prediction of action in a new context with multiple objects. Thus, the claims made by Hernik and Southgate that no goal-attribution has been made is premature and based on a rather specific definition of goal-attribution.

There is no evidence to suggest that a reach and grasp of an object (or an approach by an animated entity) would not be seen by infants as a goal-directed action, and there is some evidence that would predict that it would be. In Gergely, Nádasdy, Csibra and Biro (1995), infants were habituated to an event in which a ball jumped over a barrier and approached an object. In test trials, infants did not dishabituate when, with the barrier absent, the ball traveled in a direct, straight-line path to the object. Why did infants consider this test event, which is analogous to the single-object events under consideration, to be consistent with the original approach action in habituation? One option is that both were seen as efficient, rational, goal-directed actions given the environmental constraints and end states. Another option is that the direct approach in the test event is seen as goal-directed, but only because the previous habituation events with the barrier provided the infant with the necessary *a priori* information that this ball typically acted in an efficient manner. Both options would predict that infants should construe a direct reach to a single object as goal-directed; the first one suggests that infants see direct approaches as efficient, goal-directed actions, and the second suggests that with familiarity with an agent's rationality (presumably detected in 9 months of observation of fellow humans if it is detected in habituation trials with a novel entity), direct approaches are construed as goal-directed.

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In sum, we disagree with the strong claim that infants do not see the grasp of a single object as goal-directed. They very likely do, but do not use this information when interpreting action in a new context with other possible goal objects. This should, actually, be very exciting. What it means is that with a study like the present one, we are getting closer to a full understanding of the factors that lead an infant to extend their goal-attributions to the service of interpreting an individual's subsequent behavior in altered contexts.

References

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