



The Effects of Active vs. Passive Experience on Infants' Action Understanding

Sarah Gerson & Amanda Woodward
University of Maryland, College Park



Abstract

Previous work demonstrates that infants begin to understand goal-directed actions around six-months. However, when given experience producing goal-directed actions themselves, they can come to understand actions such as grasp as goal-directed as early as three-months. In this study, we examined the relative contributions of active versus observational training for intention understanding. Infants given active experience understood producing object-directed grasps with mittens were able to understand the goal-directed nature of a grasp in others, whereas infants without any training and those who were given equivalent observational experience with mittens did not understand this action as goal-directed. This study provides the first evidence that active experience provides unique information to intention understanding as early as three months.

Introduction

Understanding others' intentions is important to social, cognitive, and linguistic development. Converging evidence from many researchers using multiple paradigms indicates that infants have at least a basic understanding of others' intentional actions within the first year of life (Behne, Carpenter, Call, & Tomasello, 2005; Hamlin, Carpenter, Call, & Tomasello, 2005; Hamlin, Hallinan, & Woodward, in press; Luo & Baillargeon, 2007; Gergely, Nadasdy, Csibra, & Biro, 1995; Meltzoff, 1995; Woodward, 1998). This research aims to examine the origins of intention understanding in infancy.

Previous research indicates that self-produced experience plays a role in infants' understanding of intentional actions. For example, although three-month-old infants generally do not understand a simple grasp as object-directed, once given experience reaching for objects using Velcro mittens, infants of this age understood the goal of a grasp in a habituation paradigm (Sommerville, Woodward, & Needham, 2005). Additionally, recent work indicates that infants' active engagement, rather than the observation of their own actions, is the essential aspect of their experience. In a study by Sommerville, Hildebrand, and Crane (in press), infants who were trained to reach for toys using a cane later understood this means-end sequence in a habituation paradigm; infants who observed training did not.

In this study, we aim to integrate the findings from these two studies. We examine whether the first-person agentive experience is the critical component of the activity with Velcro mittens in the Sommerville et al. (2005) study. Recent work indicates that self-produced experiences provide unique information about intentions (Sommerville et al., in press), but in this study, we consider whether this is true when intention understanding is first emerging.

Does self-produced experience matter critically to initial intention understanding?

Methods

Participants: 60 3-month-old infants (mean age=3.45; 20 in each of active, observation, and control conditions)

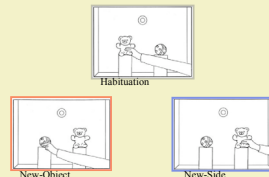
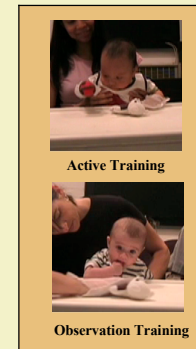
Procedure:

All infants were first given three minutes to play with the toys without any mittens (bare-handed play). Then, infants in the three conditions participated in different training sessions:

Active: These infants were given three minutes to play with the toys while wearing Velcro mittens.

Observation: Infants observed an experimenter moving the toys around with mittens according to a predetermined script created to match the activity of infants in the active condition.

Control: Infants in this condition received no further training and proceeded directly to the habituation paradigm after bare-handed activity.

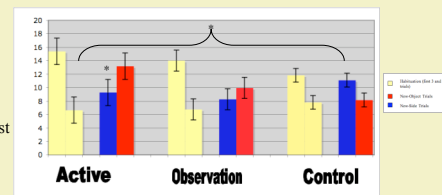


After the training session, all infants participate in the same habituation paradigm. Infants were habituated to a mittened hand reaching for one of two toys on a stage. The placement of the toys was then switched and infants saw alternating test trials in which the hand either reached in the same place for a new toy (new-object) or in a new place for the same toy (new-side). Longer looking times to the new-object trials indicates that infants attended to the goal-relation, rather than the physical sequence, in the habituation trials.

Results

In our attempt to match infants' experience with mittens, we allowed infants in the observation condition to receive more experience than their yoked match in the active condition. Infants in the observation condition received approximately 15.2 seconds more experience than infants in the active condition ($M=89.6$ and 74.4 , respectively). The experience received by the infants in these two groups was correlated, $r(38)=.796, p<.001$.

An analysis of variance with condition (active, observational, control) as the between subjects factor and trial type (new-side vs. new-object) as the within subjects factor revealed a significant Condition X Type interaction, $F(2, 57) = 4.16, p<.05$. Infants in the active condition looked longer on new-object than new-side trials, $t(19) = 2.53, p<.05$. Infants in the observation and control condition did not differentiate between the test events, $t(19) = 0.28, p>.78$ and $t(19) = 1.56, p>.13$, respectively.



Discussion

Based on our prior findings, we predicted that active mittens experience would lead infants to look longer on new-object than new-side trials and that infants with no mittened experience (i.e., control condition) would not differentiate between trials. Both of these findings were obtained.

The focal issue was whether infants given observational experience would also view the habituation events as goal-directed. They did not.

Thus, unlike active experience, closely matched observational experience did not influence infants' subsequent perception of a similar action. This finding is the first to indicate that infants' own actions provide unique structure for action perception as early as three months of age.

Future research will examine the generalizability of the knowledge gained from active experience.

References

- Behne, T., Carpenter, M., Call, J., & Tomasello, M. (2005) Unwilling versus unable: Infants' understanding of intentional action. *Developmental Psychology, 41*, 328-37.
- Hamlin, J. K., Hallinan, E. V., and Woodward, A. L. (in press). Do as I do: 7-month-old infants selectively reproduce others' goals. *Developmental Science*.
- Luo, Y. & Baillargeon, R. (2007). Do 12 5-month-old infants consider what objects other see when interpreting their actions? *Cognition, 105*, 489-512.
- Gergely, G., Nadasdy, Z., Csibra, G. & Biro, S. (1995). Taking the intentional stance at 12 months of age. *Cognition, 56*, 165-193.
- Meltzoff, A. N. (1995). Understanding the intentions of others: Re-enactment of intended acts by 18-month-old children. *Developmental Psychology, 31*, 1-16.
- Sommerville, J. A., Hildebrand, E. A., & Crane, C. C. (in press). Experience matters: The impact of doing versus watching on infants' subsequent perception of tool use events. *Developmental Psychology*.
- Sommerville, J.A., Woodward, A.L., & Needham, A. (2005). Action experience alters 3-month-old infants' perception of others' actions. *Cognition, 96*, B1-B11.
- Woodward, A. L. (1998). Infants selectively encode the goal object of an actor's reach. *Cognition, 69*, 1-34.

Acknowledgments

We would like to thank all of the undergraduates, interns, postdocs, and especially our lab managers, Neha Mahajan and Laurie Eisenband, who were essential to collecting and coding data for these studies.

This research was supported by an NIH grant (R01HD035707) and NSF grant (0634796) to the second author.