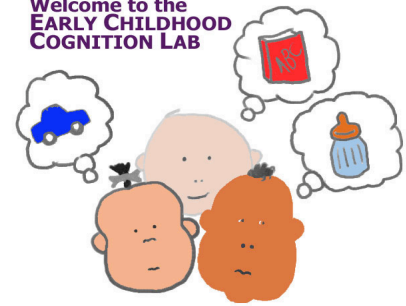


Early Childhood Cognition Lab

Welcome to the
EARLY CHILDHOOD
COGNITION LAB



Institute for Learning and Brain Sciences

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At ECCL, we are interested in exploring how infants and children develop the ability to represent and reason about human action and to explain the behavior of others. For adults, a key part of understanding our own behavior and the actions of others is perceiving behavior as motivated by a set of goals, intentions, and desires. For instance, upon seeing a woman reach for a cookie, we might decide that she likes cookies and is reaching for the cookie because she wants to eat it. This ability enables us to adjust or change our behaviors and predict the outcome of the actions of those around us. We ask:

- How do infants represent their own and others' actions? When does the understanding of our actions as guided by goals develop?
- What factors contribute to changes in infants' and children's action production and understanding?
- How do infants and children remember and learn from their own and others' actions?

CURRENT STUDIES

Social strategy use in a problem-solving context

The ability to social reference, or gain information from other people in situations of ambiguity, is a skill that increases in sophistication throughout infancy. Previous work has demonstrated that infants are capable of seeking social information in situations of emotional ambiguity (e.g. knowing whether or not to approach an unfamiliar bunny and subsequently act based on a mother's emotional affect) and begin developing social referencing skills at 6 months of age. However, little has been done to examine infants' social referencing within a problem-solving context.

In this study, 12-month-old infants were trained with either a light (70 grams) or a heavy block (700 grams). On test trials infants were presented with a problem in which they could pull a cloth to retrieve a block that appeared to be identical to the training block; however, the block actually weighed 70 grams. Thus, for half of the infants the test block was the same weight as expected and for half of the infants the block was unexpectedly light. We investigated whether infants varied their approach to the problem on the basis of expected block weight.

We found that infants trained with the heavy block were slower to approach the problem and more likely to engage in social referencing behavior (looking to the parent/experimenter, vocalizations, pointing, etc.) than infants trained with the light block. These findings suggest that infants vary their problem solving approaches in response to expected block weight, and reveal a new level of sophistication in infants' ability to seek help from others under challenging circumstances.

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Infant Studies



Understanding Others' Preferences

Adults recognize that preferences drive consistent pursuit of objects across contexts. This study examines 9.5-month-old infants' ability to generalize another person's object preference. In the study, infants observe an actor consistently pursue a target object (a toy frog or a toy car) in one room, and then move to a second room where they again observe the actor pursue that same object OR a different object. We predict that if infants understand the actor's goal as a consistent preference, they should look longer to events in which the actor goes for a novel object in the second room.

Initial results suggest that only under certain circumstances, namely, when the actor's preference display is accompanied by a brief language utterance (e.g., "I like frogs!"), do infants generalize the actor's preference to the second room. We have also found that infants' *own* language abilities are related to their performance on this task. Infants with greater reported language competency more readily transferred the actor's preference across the two rooms. These findings suggest that language plays a formative role in infants' developing understanding of others' behavior.

Understanding Causality

A critical part of mature human reasoning involves the ability to recognize cause and effect relationships and the factors that can alter cause and effect. This study investigated whether infants understand that human intervention can alter the causal status of launching sequences. Twelve-month-old infants watched a sequence in which one vehicle bumps into another vehicle. After seeing this sequence four times infants watched one of two different sequences. In the hand launching sequence, a human hand pushed the first car, so that it bumps into the second car, causing it to roll away. In the human intervention sequence, the first car rolled on to the stage but before making contact with the second car, a human hand moved the car away.

We timed infants' looking to these sequences to determine whether infants understood that the second sequence, but not the first, changes the causal relationship between the cars in the sequence. Infants demonstrated greater recovery of attention to the second sequence, suggesting that by at least 1 year of age infants recognize how human agency can alter the structure of simple causal events.

Infants' Understanding of the Properties of Tools

Adults select tools based on whether or not the tool has the functional property that enables it to fulfill a particular function. For example, a hammer is useful for hammering because it is rigid enough to force a nail into a wall. This study examines 10-month-old infants' ability to select tools on the basis of functional properties. In this study, infants were trained to use a cane to retrieve an out-of-reach toy and were then given the opportunity to select between two potential tools, a rigid cane and a floppy cane, both of which were perceptually similar to the training cane and were centered around similar toys, but only one of which was rigid enough to retrieve the toy. We predict that if infants understand the training cane in terms of its functional properties, more specifically that its rigidity makes it useful for pulling a toy within reach, that infants should be more likely to select the rigid cane than the floppy cane.

Initial results suggest that, after training, infants select new tools based on whether the tool has the functional properties for the task at hand. We found that infants were more likely to select the rigid tool than the floppy tool when there was a toy placed in the crook of each potential tool. Interestingly, when there was no toy to retrieve, infants' selections were at chance, which suggests that infants' selections are not based on a mere preference for the rigid cane. Overall, these findings suggest that infants are learning about the functional properties of tools during training.



RECENT PRESENTATIONS

- Sommerville, J. A. (2007, June). Infants' Understanding of Others' Actions: The Role of Active and Observational Experience. Paper presented at the Jean Piaget Society, Amsterdam, The Netherlands.
- Hardy, K. & Sommerville, J. A. (2007, May). Twelve-month-old infants' understanding of causality. Poster presented at the University of Washington Honors Undergraduate Research Symposium, Seattle, WA.
- Hardy, K., Yamamoto, M. E. & Sommerville, J. A. (2007, May). "I need a little help here": Eleven- and 12-month-old infants' use of social strategies during problem-solving tasks. Poster presented at the University of Washington Honors Undergraduate Research Symposium, Seattle, WA.
- Sommerville, J. A. (2007, April). Active Experience Matters: The Role of Motor Representations in Infants' Understanding of Other People's Tool use Goals. Paper presented at the biennial meeting of the Society for Research in Child Development, Boston, MA.
- Sommerville, J. A. & Schulz, L. E. (2007, April). The Hands Have It: Twelve-Month-Old Infants Recognize When Human Agency Alters Causal Structure. Paper presented at the biennial meeting of the Society for Research in Child Development, Boston, MA.
- Crane, C. C. & Sommerville, J. A. (2007, April). Once a frog lover always a frog lover? Nine-month-old infants' ability to understand and use preference information. Paper presented at the biennial meeting of the Society for Research in Child Development, Boston, MA.
- Feldman, E. N. & Sommerville, J. A. (2007, April). Tool Use in Infancy: Motoric Mastery, Featural Understanding, and Instrumental Applications. Paper presented at the biennial meeting of the Society for Research in Child Development, Boston, MA.
- Hardy, K., Yamamoto, M. E. & Sommerville, J. A. (2007, April). "I need a little help here": Eleven- and 12-month-old infants' use of social strategies during problem-solving tasks. Paper presented at the biennial meeting of the Society for Research in Child Development, Boston, MA.

RECENT PUBLICATIONS

- Sommerville, J. A. & Hammond, A. J. (in press). Treating another's actions as one's own: Children's memory of and learning from joint activity. *Developmental Psychology*.
- Sommerville, J. A. & Woodward, A. L. (in press). The link between action production and action processing in infancy. In Franck Grammont (Ed). *Naturalizing Intention in Action*.
- Sommerville, J. A. (2007). Detecting structure in action: Infants as causal agents. In A. Gopnik & L. E. Schulz (Eds.), *Causal Learning; Psychology, Philosophy and Computation*. New York : Oxford University Press.
- Sommerville, J. A. & Decety, J. (2006). Weaving the fabric of social interaction: Articulating developmental psychology and cognitive neuroscience in the domain of motor cognition. *Psychonomic Bulletin and Review*, 13, 179-200.

LAB ACCOMPLISHMENTS

- **Erika Feldman** received the Psychology Department Distinguished Teaching Award, June 2007.
- **Erika Feldman** received the Psychology Department Alcor Dissertation Grant, June 2007.
- **Kristina Hardy** received a Mary Gates Fellowship, School year 2006-2007.
- **Kristina Hardy** and **Mari Yamamoto** received travel fellowships to the Society for Research in Child Development (SRCD) Conference, April 2007.
- **Kara Braun, Emily Brown, Kristina Hardy, Hei Wat, Karen Wong,** and **Mari Yamamoto** graduated in 2007!