



AMANDA WOODWARD

## Cognitive Development in Infants

**Amanda Woodward, professor of psychology, studies babies because she would like to understand the human brain before it's been shaped by language or much experience. "They're an interesting population because they're close to just what nature brings," she says. In particular, Woodward probes how babies view other people.**

Human beings constantly infer other people's mental states—what other people want, what they know, what they see. Early in her career, Woodward became interested in whether babies distinguish people from inanimate objects. She now can say, "Even as early as 3 months, babies look at people differently than other physical objects." Recently, she has discovered that teaching babies new skills hastens their understanding of people's intentions.

So how do researchers study the thoughts of people who can't speak? One long-standing method is "visual habituation," or showing babies something repeatedly until it becomes commonplace and

then mixing up what's shown to see if the change catches babies' attention. Researchers have used this method since the 1950s to study, for example, infants' perception of colors or understanding of physics. Woodward has used this method to ask what babies understand about other people and their intentions. She and her research team test dozens of babies in any given situation, measuring where and how long they look. Any given baby may be distracted or have idiosyncratic interests, but summing up the babies' behavior shows reproducible trends.

In Woodward's lab, rooms are set up like small theaters for babies. On a stage, a human hand may poke out from behind a screen. Cameras record the action, and another camera follows where the baby audience member is looking. In another room, a student records where the baby looks and for how long.

In early experiments, the researchers repeatedly showed a hand reaching for one of two toys. After the baby was used to watching this, either the hand reached for the other toy or the positions of the toys were switched. Six-month-old babies and even 3-month-old babies suddenly paid attention when the hand grabbed a new toy, more than if the hand grabbed the same toy in a new position. "In almost every experiment, incidental changes in how a hand moves are uninteresting, but changes in goals are riveting," says Woodward.

These results hold only if a human hand is reaching for the toys. If instead a mechanical claw performs the same behavior, babies look at new movements with as much attention as new goals. Babies care about the intentions of people but not mechanical devices.

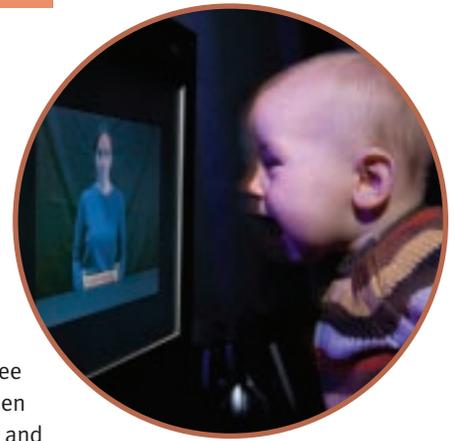
In more recent experiments, Woodward has shown that one can promote an understanding of other people's actions by helping babies learn to perform related behaviors. By age 1, babies understand that a person pulling a piece of cloth with a toy on top is pulling the cloth to get the toy. At 10 months, some babies get this idea,

but others focus just as much on the cloth as the toy on top. Woodward and her team found that babies who would pull fabric to get a toy interpreted the adults' behavior that way. "We see a nice relationship between babies' own ability to act and their understanding of other people's actions," she says.

Woodward's team started to see if they could get much younger babies to understand the cloth-pulling trick. They started fitting babies as young as 3 months old with Velcro "sticky mittens" designed by Amy Needham, a psychologist at Duke University. The mittens helped young babies learn that they could get toys by pulling the cloth underneath. Even 3-month-old babies experienced with the mittens were able to tell when an adult was pulling a cloth to get a toy. "All this impressive learning not only gives them motor skills but gives them information to interpret others' behaviors," says Woodward.

Besides watching how long babies watch various behaviors, Woodward's group also uses an eye tracker that reveals exactly what a baby is watching. With this instrument, Woodward and her coworkers have shown that babies anticipate people's actions, for example looking toward what a hand is reaching for. Woodward wants to use eye trackers to test whether babies' abilities influence where they look. "We see that babies reproduce other people's goals so long as they understand what other people's goals are," says Woodward.

In addition to yielding insights into human development, this kind of research could provide a firmer foundation for studying autism, a disorder in which children are thought to lack awareness of other people's feelings and intentions. Woodward says her research also gives practical insights on how babies learn—not through technologies like videos but by interacting with the world. "Babies are developmental machines. They are built to actively create the learning experiences that they need," she says. —Karin Jegalian



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