



## Sixteen-month-old infants are sensitive to competence in third-party observational learning

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### ABSTRACT

Observational learning is important to development, but not all adult models are equally informative and accurate. Selectivity is important in observational learning. Past research studies have not always differentiated competence and confidence, so the current study investigated infants' selective imitation after observing third-party interactions, when confidence and competence were varied independently. Forty-eight 16-month-olds watched a model demonstrate the function of tools while displaying high or low levels of confidence and competence. Infants were significantly more likely to imitate individuals who were competent and were influenced less by their confidence level. Infants were more likely to reach for and use the working tool if the model was competent in her tool choice, but infant behavior was less affected by differences in confidence. Results suggest that by 16-months of age infants are sensitive to the competence of a demonstrator, suggesting a bias in social learning towards more valuable information.

Infants and children learn from observing others' behavior and approaches to problem-solving. However, actors vary with respect to their knowledge about how things work, and some observations can be irrelevant or even misleading. Selectivity in learning would increase the value of observational learning. The relevant literature reveals that children do learn selectively, preferring some informants over others. An informant who delivers accurate information may be preferred, but it is not clear whether 1) the child learner is sensitive to cues of confidence, or 2) is sensitive to the quality of the information itself, the informant's competence. The following study seeks to dissociate these two factors in the context of third-party observational learning. Does imitation depend on the competence or the confidence of an adult who is demonstrating a skill to a third-party?

### 1. Selective social learning

Children show selective social learning in the field of language acquisition. Children are sensitive to a speaker's previously displayed knowledge, and this sensitivity is reflected in their willingness to learn an association between a new label and its referent only from an accurate informant (Birch, Akmal, & Frampton, 2010; Koenig & Woodward, 2010; Nummoo & Robinson, 2009; Sabbagh & Baldwin, 2001; Sabbagh & Shafman, 2009). Four-year-olds have been found to prefer to learn from an informant who was previously accurate over one who made mistakes in naming or describing familiar objects (Corriveau & Harris, 2009; Harris & Corriveau, 2011; Koenig & Harris, 2005), and even 18-month-olds are less likely to imitate an adult actor who has shown inaccuracies in labeling common objects (Brooker & Poulin-Dubois, 2013). Children even trust accurate children over inaccurate adults in word-learning tasks (Jaswal & Neely, 2006).

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Children can also use non-verbal cues to evaluate potential informants. One study demonstrated that 14-month-olds followed the gaze of reliable but not unreliable lookers. The infant had previously seen each looker expressed happiness when looking into an opaque container. While the reliable looker's container held a toy and the unreliable looker's container was empty (Chow, Poulin-Dubois, & Lewis, 2008). In a follow-up study using the same manipulation, 14-month-olds were more likely to use their forehead, rather than their hand, to turn on a press-on light after watching a reliable looker, but not an unreliable looker turn the light on with her forehead (Poulin-Dubois, Brooker, & Polonia, 2011).

In one study with 24-month-olds, when toddlers were encouraged to operate a novel toy they were more likely to imitate the actions of a confident informant over the non-confident informant, suggesting that toddlers used the demonstrator's non-verbal cues of certainty and confidence to guide their own imitative behaviour (Birch et al., 2010). The apparent authority of the actor was found to be relevant in one study: 3- and 4-year-olds were twice as likely to learn from actors to whom others had paid attention over an actors whom others had ignored (Chudek, Heller, Birch, & Henrich, 2012). A similar phenomenon was reported with 36-month-olds when, in a between-subject design, toddlers who had trouble opening a drawer imitated the steps of an adult who had successfully opened a similar drawer, but not an adult who had failed to open a drawer (Williamson, Meltzoff, & Markman, 2008). In a social referencing paradigm, 12-month-old infants were more likely to respond to the positive (or negative) reaction of a competent adult (who played competently with a toy) over another adult, regardless of whether the adult actor was familiar to the infant (Stenberg, 2013).

There is evidence to suggest that an informant's apparent competence also plays a role in how infants and children use information from others. One study reported that 14- to 18-month-olds were less likely to imitate an "accidental action" (i.e. pressing a lever followed by a verbal "oops") than an "intentional action" (i.e. pressed a lever followed by a verbal "there"; (Carpenter, Akhtar, & Tomasello, 1998). Here the utterance "oops" indicates the actor's unequivocal acknowledgement of an accidental action, and therefore relates to competence more than confidence. Together, these studies provide evidence that children are selective in social learning: young children prefer information provided by confident and competent informants.

## 2. Learning from third-party observation

Although in some circumstances, directed pedagogy enhances learning (Csibra & Gergely, 2009; Gergely & Csibra, 2005), a growing body of evidence suggests that children can and do learn from observation alone in the absence of any pedagogy or instruction (Akhtar, 2005; Akhtar, Jipson, & Callanan, 2001). Toddlers can learn and imitate novel actions by observing third-party interactions (Herold & Akhtar, 2008; Matheson, Moore, & Akhtar, 2013). Eighteen-month-olds have been shown to be sensitive to their third-party observations of a display of anger between two experiments by imitating less in the anger (compared to neutral) condition (Repacholi & Meltzoff, 2007). There are cross-cultural differences, such that in some cultures (e.g. Mayan-Yucatan) explicit education is not common, and children are expected to learn by observing adults performing everyday tasks (Mejia-Arauz, Rogoff, & Paradise, 2005; Rogoff et al., 1993). Even in third-party observational learning, children prefer some informants over others. Children as young as sixteen months of age show selectivity with respect to whom they will imitate, preferring to imitate prosocial individuals over mean individuals (Hamlin & Wynn, 2012).

## 3. Competence or confidence?

Five-year-olds may prefer to rely on a competent over a confident informant: When preschoolers saw videotaped informants who varied in competence and confidence: The child was given the opportunity to label an unknown animal following the advice of one of the two informants. Four-year-olds' performance was at chance, but 5-year olds preferred the hesitant but accurate informant over the confident but inaccurate informant (Brosseau-Liard, Cassels, & Birch, 2014).

There is some evidence that young children are sensitive to cues to confidence. Brosseau-Liard and Poulin-Dubois (2014) reported that in the absence 24-month-olds were more likely to imitate an experiment if she appeared confident, although 18-month-olds showed no such preference in response to the same display.

## 4. The current study

The current study was designed to dissociate the influence of an actor's competence and confidence on an infant's third-party observational learning. We used a non-verbal demonstration and imitation task in order to test whether infants were sensitive to either the competence or the confidence of an informant. Sixteen-month-olds were tested since children this age have been shown to demonstrate selective observational learning. (Carpenter et al., 1998; Hamlin & Wynn, 2012).

In the current study, infants watched as an experimenter demonstrated the use of a tool to turn on a light to a third party. In one condition, she was confident and competent, in a second condition, she was also confident, but a lack of competence was operationalized by showing her failing at the task before she succeeded. This manipulation was chosen because if the experimenter's first and only attempt with the toy was successful, this could be taken as evidence of competence, whereas an initial failure but subsequent success displayed a relative lack of competence while equating information about the affordances of the object which are critical to the test phase. In a third condition she was competent, succeeding at the task on her first attempt, but did not display the same cues of confidence. Following habituation to one of these demonstrations, infants were given an opportunity to use one of the two tools to turn on the light.

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