



Does contingency in adults' responding influence 12-month-old infants' social referencing?



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ABSTRACT

In two experiments we examined the influence of contingent versus non-contingent responding on infant social referencing behavior. EXPERIMENT 1: Forty 12-month-old infants were exposed to an ambiguous toy in a social referencing situation. In one condition an unfamiliar adult who in a previous play situation had responded contingently to the infant's looks gave the infant positive information about the toy. In the other condition an unfamiliar adult who previously had not responded contingently delivered the positive information. EXPERIMENT 2: Forty-eight 12-month-old infants participated in Experiment 2. In this experiment it was examined whether the familiarity of the adult influences infants' reactions to contingency in responding. In one condition a parent who previously had responded contingently to the infant's looks provided positive information about the ambiguous toy, and in the other condition a parent who previously had not responded contingently provided the positive information. The infants looked more at the contingent experimenter in Experiment 1, and also played more with the toy after receiving positive information from the contingent experimenter. No differences in looking at the parent and in playing with the toy were found in Experiment 2. The results indicate that contingency in responding, as well as the familiarity of the adult, influence infants' social referencing behavior.

1. Introduction

The world is full of objects and people for the infant to explore and learn about. Young children are constantly encountering new or ambiguous events in which they have no previous experience with, such as the first time an infant encounters a cat or comes across an ambiguous tool. When such situations arise infants make use of other people as information resources. By watching others' emotional and behavioral reactions to the event, infants gain valuable information about how to handle the situation, (i.e., social referencing, [Feinman, 1982](#)). Thus, after looking at the cat, the infant checks the parent's reactions to determine if the cat is dangerous or approachable.

Infants, however, do not treat all information alike. Instead, infants are selective in whose information they use. Already at 12 months of age, infants use information coming from an adult who has shown that she is a competent person rather than from an adult who has been found to be incompetent. [Stenberg \(2013\)](#) demonstrated that infants played for a longer period with an ambiguous toy after receiving positive information from an adult who was successful in a task than when the information was provided by an adult who was not. Three-year-olds prefer to ask questions to and learn novel words from an informant who has proved to be accurate (one who previously named objects correctly), than one who named objects incorrectly ([Birch, Vauthier, & Bloom, 2008](#); [Harris, 2007](#)).

When information is needed, it is also essential to seek guidance from a person that infants may expect will respond. Shortly after birth, young infants begin to learn about other people's responsiveness. Especially, adults tend to respond to infant behaviors

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perceived to involve emotions. During early face-to face-interaction, infants' affective displays, gestures, and vocalizations typically influence the caregiver's behavior. The caregiver responds almost immediately to the infant's actions by imitating the particular behavior the infant displays, by making non-speech sounds, or by giving verbal comments (e.g., Gros-Louis, West, Goldstein, & King, 2006; Paavola, Kunnari, Moilanen, & Lehtihalmes, 2005). Thus, the young infant learns that others' responses are often contingent upon the infant's own actions. Such contingent responding by the caregiver allows the infant to experience that her or his behavior influences the caregiver's behavior (e.g., Masur & Olson, 2008; Bornstein, Tamis-LeMonda, Hahn, & Haynes, 2008), and the infant perceives that his or her actions have consequences on the environment, making environmental events more predictable. This, in turn, has a bearing on the young infant's growing self-knowledge and is of great importance to the infant's social, emotional, and intellectual development (e.g., Keller, Kärtner, Borke, Yovsi, & Kleis, 2005). Contingent responding to the infant's displays also increases the rate of the infant's behavior (e.g., Soussignan, Nadel, Canet, & Gerardin, 2006), influences the development of vocal productions (Goldstein, Schwade, & Bornstein 2009; Goldstein & Schwade, 2008), and reinforces early vocal responding (e.g., Pelaez, Virues-Ortega, & Gewirtz, 2011).

Already at 2 months infants can detect the *lack* of contingency in the behavior of others (e.g., Soussignan et al., 2006). Results from still-face studies show that infants are sensitive to disruptions in the communicative pattern during face-to-face interaction (e.g., Ekas, Haltigan, & Messinger, 2013; Franklin et al., 2013). For example, McQuaid, Bibock, and Carpendale (2009) reported that the mother's contingent responding during the initial interacting phase of a still-face procedure was predictive of the infant's social bids during the next phase of the procedure, the still-face phase, when the parent remains still-faced. The 4-month-old infants, whose mothers responded contingently, made more bids to reengage the mother in an interaction than the infants whose mothers were less contingently responsive. Macquaid and colleagues interpreted their results as infants develop expectations based on the mother's previous responsiveness during an interaction, about how the interaction will unfold. Furthermore, infants can also maintain expectations for contingency in adult responding for several days (Bigelow & Birch, 1999). The 4- and 5-month-old infants in the study by Bigelow and Birch (1999) made two visits to the laboratory within a week. At their first visit they were presented with social interaction from one adult who interacted contingently and another adult who interacted non-contingently. Both adults interacted simultaneously via video. Although both adults interacted contingently with the infants at their second visit, the infants were more attentive to the adult who, 6 days earlier, had been contingently interactive when the infants looked at her than to the adult who previously had acted non-contingently.

Especially in ambiguous situations, there is a need to immediately get a response when the infant turns to another person for guidance. Results from a study conducted by Striano, Henning, and Vaish (2006) suggest that infants in novel situations may be more prone to look for information from persons who have proven to respond contingently to the infant's looks rather than from persons who have not. Striano et al. (2006) presented 12- and 13-month-old infants with an initial play situation in which one adult always responded contingently by emitting positive, short utterances, upon each look the infant directed toward the adult, and another adult who never responded contingently upon an infant look. The infants received the same amount of vocal feedback from both adults, because the non-contingent adult always repeated the contingent adult's utterances with a 1, 2, or 3 s delay (in a non-systematic manner). In a subsequent situation, the infants were exposed to a novel toy. From a social referencing perspective, infants are expected to *look for information* from an adult when the situation becomes novel. During toy exposure, Striano et al. (2006) found that the infants looked more at the contingent adult than at the adult who had responded in a non-contingent manner in the previous play situation. These results suggest that a person's prior contingency in responding may influence infants' selection of informants in novel situations, and that infants may form expectations based on the timing of others' responses.

In a typical social referencing study, the infant is exposed to a novel or ambiguous stimulus (for example a novel toy). During the exposure, the infant typically receives information (positive or negative) from an adult about the stimulus. In this first phase of a social referencing process, infant information-seeking behavior is examined (i.e., infant looking at the adult). The infant is then expected to *use the information* to guide her or his behavior with respect to the novel stimulus (e.g., approach or avoid the stimulus) (i.e., infant behavior regulation). Thus, in the second phase of a social referencing process, the infant's reactions toward the novel stimulus are examined in order to determine if the infant's behavior is regulated in accordance with the emotional message. In the Striano et al. (2006) study, neither of the two experimenters provided verbal information to the infant when the novel toy was presented. Accordingly, infant behavior regulation was not examined in that study. Thus, it remains an open question as to whether an adult's prior contingency of responding also influences the infant's willingness to *use* information coming from him or her.

Some studies have examined differences in infants' reactions to non-contingent responding from caregivers and strangers. Hains and Muir (1996) used a TV-replay procedure, based on the still-face-procedure, where infants and mothers interacted over close-circuit television. They found no difference in attention (i.e., looking at mother) and affect between the 5-month-olds in the control group who exclusively engaged in episodes of contingent interaction with their mothers and the 5-month-olds in the experimental group who engaged in both contingent and non-contingent interactions with mother. In a second experiment (Hains & Muir, 1996), when a stranger during a similar procedure interacted with 6-month-old infants, the infants were more attentive during contingent than during non-contingent episodes. In this second experiment, the infants and the stranger interacted over close-circuit television as well as live. The authors suggested that because infants share a prior history of interactions with their mothers, they could be expected to be prepared to be exposed to non-contingent responding now and then. Thus, infants may form different expectations for contingency in responding based on their prior experiences of interacting with different persons. Bigelow and DeCoste (2003), on the other hand, did not find any differences in infants' responses to non-contingency displayed by mother and stranger when 4- and 6-month-old infants interacted during contingent and non-contingent episodes with mother or a stranger. The infants' attention decreased during non-contingent episodes following contingent episodes, regardless of whether the infants were interacting with the mother or the stranger. However, because these studies used different procedures (e.g., in the study by Bigelow and DeCoste the

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