

# Object Processing in 4- and 9-Month Infants: Functional Outcomes of Social Interaction

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## Abstract

In this study, we examined the effects of differing social cues on object processing in 4- and 9-month-old infants. Our results show that, while joint attention facilitated object processing in the older infants, simpler object cuing enhanced the ability of 4-month-olds to extract information about a novel object.

## 1. Introduction

Joint attention is considered to provide the basis for shared experiences necessary for many aspects of infant development and learning, including language acquisition (e.g., Baldwin, 1995; Dunham & Moore, 1995, Tomasello, 1995). One theory has suggested a “9 month revolution” (Tomasello, 1995) to explain aspects of social cognition and systematic use of joint attention in human infants. In this model, an abrupt cognitive change takes place at around the ninth month, and infants begin to successfully integrate a number of social cognitive skills, interacting with people and outside objects in ways that differ from the behaviors observed earlier in ontogeny. Infant engagement in triadic attention from 9 months has been the subject of much study (e.g. Carpenter et al., 1998), and it is well documented that around this age, infants engage systematically in joint attention interactions involving the infant, and adult partner, and an external object. However, the function of joint attention at and before 9 months has received little attention. While many studies indicate that infants modify their own behavior according to the social signals they receive, little is known about the influence of the social partner’s behavior on infants’ processing of the object world. This is surprising, given how often infants learn about the outside world in social contexts.

## 2. Methods and Results

In this study, we examined the effects of differing social cues on object processing in 4- and 9-month-old infants. An adult experimenter spoke to the infants about a novel object in one

of two conditions. In the *Joint Attention* condition, the experimenter spoke to the infant about the toy while alternating gaze between the toy and the infant. The *Object Only* condition was identical, except that the experimenter looked to the toy and to a spot on the ceiling, but never to the infant. In test trials, infants viewed the toy used in the social interaction and a novel toy. 4-month-old infants looked significantly longer to the novel toy compared to the familiar toy following the *Object Only*, but not the *Joint Attention* condition. In contrast, 9-month-olds looked to the novel toy significantly longer following the *Joint Attention* condition only. These results show that, while joint attention facilitated object processing in the older infants, simpler object cuing enhanced the ability of 4-month-olds to extract information about a novel object.

All learning systems make assumptions on data input necessary to facilitate the learning process. Developmental research on infants’ use of social cues to facilitate learning could thus be relevant to robotic systems that a) learn through interaction or b) learn to communicate with other robots and humans, particularly in the context of extracting cues from the outside environment.

## References

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