Journal of Experimental Child Psychology 124 (2014) 67–77

Contents lists available at ScienceDirect

Journal of Experimental Child Psychology

journal homepage: www.elsevier.com/locate/jecp

Shared function knowledge: Infants' attention to function information in communicative contexts

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ARTICLE INFO

Article history:
Received 8 October 2013
Revised 29 January 2014
Available online 23 April 2014

Keywords:
Social learning
Natural pedagogy
Generic knowledge
Infancy
Function knowledge
Social cognitive development

ABSTRACT

Humans are specifically adapted to knowledge acquisition and transfer by social communication. According to natural pedagogy theory, infants are highly sensitive to signals that indicate a teacher's communicative intention and are biased to interpret communicative contexts as conveying relevant and generalizable knowledge that is also shared by other conspecifics. We investigated whether infants as young as 12 months interpret ostensively communicated object-directed emotion expressions as generalizable and shareable with others. Given that young infants pay particular attention to information about objects' functions, we were interested in whether the shareability assumption also holds for emotional attitudes toward functional features of unfamiliar objects. The results suggest that 12-month-olds ($N = 80$) flexibly interpret another person's emotion displays toward unfamiliar artifacts either as object-centered and generalizable attitudes or as person-centered subjective attitudes, depending on the communicative characteristics of the learning context. Furthermore, the transfer of ostensively communicated information about the artifacts depended on their functional usability, which is consistent with infants' early sensitivity to function information in various areas of cognitive development.

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http://dx.doi.org/10.1016/j.jecp.2014.01.019
0022-0965/

Introduction

Human cognition is characterized by the facility for learning from and teaching other individuals. This enables us to acquire knowledge that otherwise would be difficult to obtain by individual learning processes. This ability to engage in collaborative learning is assumed to be the basis for human culture (e.g., Butler & Markman, 2012; Gergely & Csibra, 2005; Tomasello, 1999). Proposing a human-specific social communicative learning system, the so-called natural pedagogy, Csibra and Gergely (e.g., 2006, 2009) described the preconditions and correlated mechanisms that allow for the fast and efficient acquisition and transmission of culturally shared generic knowledge.

According to the natural pedagogy theory, communicative demonstration contexts are typically characterized by a teacher (adult) displaying ostensive behavioral signals, such as direct eye contact and infant-directed speech, to address the learner (infant). These signals are followed by deictic referential gestures, such as gaze shift and pointing, that help the addressee to identify the referent of the learning context (e.g., Csibra & Gergely, 2009; Gergely & Csibra, 2003). Ostensive signals indicate the adult's communicative intention to manifest new and relevant information *for* the infant. It is supposed that human infants are highly sensitive to these signals (e.g., Csibra & Gergely, 2009; Sperber & Wilson, 1986) and that infants are biased to interpret ostensive communicative contexts as revealing kind-relevant knowledge about a specifically referenced object or event and knowledge that is shared by other individuals of the social community (Csibra & Gergely, 2006).

A growing number of studies suggest an innate sensitivity and preference for ostensive signals such as direct eye contact, infant-directed speech, and contingent reactivity (e.g., Farroni, Csibra, Simion, & Johnson, 2002; Grossmann et al., 2008; Senju & Csibra, 2008). Empirical support for the *genericity assumption*, infants' tendency to interpret ostensive communicative contexts as revealing kind-relevant generic information about a referent, comes from studies where information was encoded differently depending on whether it was embedded in an ostensive communicative or non-communicative context. For example, Yoon, Johnson, and Csibra (2008) showed that 9-month-old infants encode information differently depending on whether it is presented in an ostensive communicative context compared with a non-communicative context. After having seen an actress ostensively greeting the infant and showing a pointing gesture toward an unfamiliar object (ostensive communicative context), infants showed longer looking times at test if the object was replaced by another object compared with test outcomes with the object placed at a different location or test outcomes with no changes at all. In contrast, infants who saw the actress constantly looking at the object and showing an (unsuccessful) reaching gesture showed longer looking times only at test outcomes including a location change of the object. That is, considering limited memory resources, infants in an ostensive context were more likely to encode stable identity-relevant information about an object, whereas in a non-communicative context they preferentially retained action-relevant and more transient information about the object's location. In accordance with natural pedagogy theory, this early sensitivity to ostensive signals specifying infant directed communication represents important learning mechanisms by determining what type of information will be encoded in a given context.

Being interested in infants' interpretation of a teacher's ostensively marked emotion expressions toward an object, Gergely, Egyed, and Király (2007) found that 14-month-old infants interpret such emotional gestures as conveying information about the properties of the object rather than expressing person-specific subjective preferences of the communicator toward the referent.

Recent studies suggest that 18-month-olds interpret ostensively communicated emotion expressions toward an object as revealing general valence information about the object that is also relevant to and shared by other people. In contrast, when the same emotion expression is displayed in a non-communicative context, infants' interpretation is subject centered; infants interpret the observed emotion expression as a person-specific attitude and not as information about the object's property. Accordingly, this information is not assumed to be shared by others (Egyed, Király, & Gergely, 2013). Given that 18-month-olds show context-dependent interpretations of information about emotional attitudes, the current study investigated whether this type of specific information processing can already be found in younger infants and whether it also holds for other types of information, namely information about functional object features. In their study, Egyed and colleagues (2013)