same might be true for those living on an African-American inner-city "atoll" within a predominantly Caucasian middle-class city. Once an emphasis on group rather than individual processes is established, the situations in which that understanding is fostered become criterial and could tend to self-perpetuation. But what may work well on an atoll may not work elsewhere – what is better, more complete, or more adequate in one social or cultural situation may not be so in another.

That being said, there is still no reason per se why cultural variability need go hand-in-hand with a view of passive transmission of mental concepts to the child. The child is influential not only in constructing his or her understanding but also in defining the context in which learning takes place, and even the content of what should be learned. Furthermore, individuals are not the only things that interact in relationship – groups, societies, cultures all relate and influence one another.

In short, although I applaud C&L's efforts to make social interaction the center of development, rather than merely an add-on explanatory variable, I feel they are not radical enough. Seeing triadic interactions as the epicenter of development does not necessitate relegating cultural variability to the sidelines. Children's development is not constructive only in the sense that they gradually cobble together cultural criteria for language use and other behaviors. It is also constructive because part of their development consists in constructing the criteria for themselves and for others. Without this active transforming of the world, caregivers would never adapt to their children, peers would never learn how to pacify or enrage their playmates, and societal and cultural change would not exist.

Interpretation based on richness of experience: Theory development from a social-constructivist perspective

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Abstract: The view that children's understanding of mind is constructed through social interaction is consistent with other social-constructivist models. We provide examples of similar claims in research on emotion perception, pretense understanding, autobiographical memory, and event knowledge. Identification of common elements from such socio-cultural perspectives may lead to greater theoretical integration and provide a new framework for exploring human development.

Carpendale & Lewis (C&L) propose that the development of understanding of others' minds grows not from a kernel of knowledge already in a child's brain, nor from the assumption of environmental-cultural norms, but through dynamic, ongoing interactions with caregivers and the physical world. This is a welcome step into the already burgeoning literature in a number of areas – motor development, cognitive development, socio-emotional development – spurred by theories such as dynamic systems, the ecological approach, and contextual approaches. The view that children's understanding of mind is part of the larger process of social understanding and is constructed through social interaction is consistent with other models that attribute a critical role to the process of social interaction in development. We provide examples of similar claims in research on the development of the perception of emotion, pretense understanding, autobiographical memory, and event knowledge. These lines of research provide support for the notion that richness of experience, not rich interpretation, provides an interpretive framework for understanding children's emerging understanding. They also indicate that social interaction is fundamental to human development across a wide range of social, emotional, cognitive, and perceptual phenomena.

C&L argue that development of an understanding of others' minds (intentions, beliefs, emotions) is not "all or none." Research on infants' understanding of emotional expressions supports this contention. Whether an infant perceives an emotional expression and responds to it depends on the age of the infant, the expression that is being enacted, the task by which the experimenter measures perception, the definition of perception (detection, discrimination, recognition, understanding), and the context in which the expression is encountered (Walker-Andrews 1997). Infants as young as three months show intermodal matching for their mothers' happy and sad facial-vocal expressions, but not for expressions posed by a female stranger (Kahana-Kalman & Walker-Andrews 2001) Similarly, infants show intermodal matching for fathers' happy and sad facial-vocal expressions only when they have highly involved fathers (Montague & Walker-Andrews 2002). Lest one think that this is because infants are merely exposed to maternal expressions more than paternal expressions, refer to research by Dunn and colleagues (Dunn et al. 1991a; 1991b) that illustrates the importance of the family context and interactions in the perception of emotion by children.

Children's understanding of the pretense of others also develops gradually (Harris 1994b). For example, Walker-Andrews and Kahana-Kalman (1999) concluded in a study of pretense understanding that "toddlers move from appreciating that an adult partner initiated a game of pretend to understanding the pretend stipulations of the adult, and finally, at 24 months, to using that understanding to enter into collaborative pretend play" (p. 531). In particular, some 15- and 18-month-olds imitated the experimenter's pretend transformations as a way to coordinate actions with the experimenter. To borrow from the description of children's involvement in deception, the toddlers entered into the pretense "with only partial understanding and such experience is the context for learning" (target article, sect. 4.1, para. 6) about such mental states as pretense and deception. The comprehension of another's pretense emerges early in the second year, but the ability to tailor one's pretend actions in that interaction is not demonstrated until later.

C&L propose that conversation provides a context for children to interpret and talk about the mental world. Conversation also provides a context for thinking and talking about past events, as demonstrated by extensive research on the development of young children's autobiographic memory (Reese 2002). Although children's contributions to conversations at two to three years consist solely of short answers to specific questions, over time, children develop the narrative skills to discuss the past more fully and to eventually construct independent memory narratives (Haden et al. 1997; Hudson 1990; Nelson 1993). Through conversation children learn *how* to remember, not *what* to remember; they do not simply repeat what was told to them but acquire memory and narrative skills (Hudson 1990). This distinction is similar to C&L's argument that through social interaction, children do not simply adopt socially available knowledge, but rather, construct their own understandings within the interactional context. Research has also shown that individual differences in parents' reminiscing style affect children's independent narrative ability in later years, indicating that characteristics of the dyadic relationship influence children's autobiographic memory development (Reese et al. 1993).

Finally, research on the development of event knowledge illustrates the tension between performance factors and underlying competence discussed by C&L. A large body of research has shown that children's generalized event representations (GERs) provide a cognitive context for the development of memory, planning, narrative, inferential reasoning, and temporal understanding (Nelson 1986). Before children display these skills in novel, decontextualized, experimental tasks, they accurately use temporal language, draw appropriate inferences, construct future plans, remember stories and events, and construct story narratives when reasoning about familiar events in meaningful interactive contexts

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(Hudson 1993; Hudson et al. 1995). This reprises the issue of the role of partial understanding in development. Researchers examining the role of event knowledge in children's cognitive development have argued that knowledge displayed within familiar contexts provides the foundation for later, more generalized skill. Just as a lexicon for talking about the mental world provides children with a cognitive resource for reflection and interpretation, children's GERs allow initial "understanding-in-action" to be consolidated through reflection on internal event representations.

We propose that a more social-interactional approach is needed at this stage of social-constructivist theory development. All of these lines of research stem from approaches emphasizing the social-cultural embeddedness of development. Although specific mechanisms may vary, they constitute a "family" of social constructivist approaches. Our single concern with the C&L model is that it may not be adequately inclusive. The tendency to label as "passive enculturation" approaches that vary in small degrees from the C&L position may limit the potential for integration across research domains. Rather than focusing on differences from an individualist framework, joint attention on common principles and collaborative interactions may be more fruitful for theory development.

What infants know about intentional action and how they might come to know it

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Abstract: Carpendale & Lewis (C&L) propose that social knowledge is constructed from triadic interactions. This account generates testable predictions concerning social knowledge in infancy. Current evidence is not entirely consistent with these predictions. Infants possess action knowledge before they engage in triadic interactions, and triadic use of an action does not always precede knowledge about the action.

Carpendale & Lewis (C&L) propose an ontogenetic relation between interacting and knowing: By participating in increasingly well-organized social exchanges, children come to construct a theory of mind. Evaluating this proposal requires measuring both social actions and social knowledge. Given this requirement, C&L's review reveals striking gaps in the empirical record. The infant work presented concerns assessments of social behavior, although underlying social cognition (or lack thereof) is only inferred. The studies of older children concern social cognition as assessed in interview studies, with factors such as parenting style standing as proxies for children's social interactions. A full account must address both gaps. We will focus on the first.

C&L propose that triadic interactions, in which the infant and caretaker mutually coordinate attention on the same object, are necessary for the construction of social knowledge and, ultimately, a theory of mind. Because infants do not engage in triadic interactions until the end of the first year of life, this account predicts that they have not yet begun to construct social knowledge. C&L further predict that, once triadic interactions are established, social behavior relevant to a particular aspect of intentional knowledge will emerge before the knowledge itself does. Recent evidence from our laboratory and others' speaks to these predictions. This evidence indicates that triadic interactions and social knowledge do not always travel together in ontogeny.

Aspects of social knowledge are present months before infants engage in triadic interactions. Infants represent actions not as purely physical motions through space but rather as directed at objects or states of affairs (Baldwin et al. 2001; Csibra et al. 2003; Gergely et al. 1995; Moore 1999; Woodward 1998; Phillips et al. 2002). To illustrate, in one study (Woodward 1998), 6-month-old infants viewed a person reaching for and grasping an object. Following habituation, infants demonstrated a stronger novelty response to test events that disrupted the relation between agent and object than to test events that maintained this relation while varying the spatial properties of the reach. Infants did not respond in this way when viewing inanimate objects that touched or grasped other objects, or when viewing manual contact that appeared purposeless to adults (Woodward 1999). Therefore, infants' social knowledge reflects a foundational aspect of mature conceptions of intentional action – namely, that certain human actions are object-directed (see Barresi & Moore 1996).

This work highlights infants' knowledge about instrumental actions. C&L focus on interactions in which infant and caregiver share attention, as expressed by looking and pointing. But these are just a subset of the actions that adults view as intentional. Indeed, many investigators have elucidated infants' developing ability to extract the goals behind observed instrumental actions (Gergely et al. 2002; Meltzoff 1995; Wenner & Bauer 1999; Woodward & Sommerville 2000). Our recent findings are consistent with the thesis that experience contributes to infants' construction of social knowledge; however, in this case what matters appears to be infants' experience of acting on objects rather than of participating in triadic interactions (Sommerville & Woodward, in press).

Recent studies also elucidate infants' knowledge about the actions involved in triadic exchanges. Infants begin to follow gaze during the first year of life, but, as many have noted, this observation alone does not tell us whether infants understand the "looking at" relation (e.g., Barresi & Moore 1996). Several studies indicate that by 12 months, infants encode looking and pointing as relational (Moore 1999; Phillips et al. 2002; Woodward 2003; Woodward & Guajardo 2002). Prior to 12 months, infants respond to gaze by orienting their own attention but seem not to encode the relation between looker and object (Woodward 2003). This pattern of findings is consistent with C&L's proposal. Infants begin to understand the looking relation after several months of responding appropriately to shifts in others' gaze.

However, the emergence of pointing suggests that this pattern does not hold in all cases. Knowledge about pointing is evident before infants employ it robustly in triadic interactions. Infants' first points are often described as indexing their own attention rather than being communicative (Bates et al. 1979; Schaffer 1984a). It is not until 12 to 15 months of age that infants produce points in a clearly communicative manner and follow others' points to their distant referents (Bakeman & Adamson 1986; Carpenter et al. 1998; Desrochers et al. 1995). Furthermore, infants do not use contextual cues to determine when to point until around their second birthday (e.g., Dunham et al. 2000; Moore & D'Entremont 2001). Consistent with the thesis that experience is related to knowledge, at 10 months, those infants who produce object-directed (but not clearly communicative) points understand observed points as relational (Woodward & Guajardo 2002). Therefore, although experience may contribute to infants' knowledge about pointing, the evidence suggests that the relevant experience is not triadic in nature.

To conclude, recent findings indicate that although triadic interactions may be one source of infants' social knowledge, they are not the sole source. Infants are sensitive to the object-directedness of instrumental actions well before the onset of triadic interactions and come to understand certain actions before using them in triadic interaction. In addition to interaction, firsthand agentive experience is a likely contributor to this system of knowledge. That is, there seems to be more than one route into social understanding. This may account for the fact that all normally developing children construct a theory of mind despite the existence of broad cross-cultural variation in the nature of early triadic interactions and habits of talk about the mind (Lillard 1998; Rogoff et al. 1993).

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