

Why Is Infant Language Learning Facilitated by Parental Responsiveness?

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Abstract

Parents' responsiveness to infants' exploratory and communicative behaviors predicts infant word learning during early periods of language development. We examine the processes that might explain why this association exists. We suggest that responsiveness supports infants' growing pragmatic understanding that language is a tool that enables intentions to be socially shared. Additionally, several features of responsiveness—namely, its temporal contiguity, contingency, and multimodal and didactic content—facilitate infants' mapping of words to their referents and, in turn, growth in vocabulary. We close by examining the generalizability of these processes to infants from diverse cultural communities.

Keywords

language development, parenting, responsiveness, word learning, infancy

How do infants transition from prelinguistic babblers to relatively skilled consumers and users of words and sentences in a span of 2 short years? We share the view with a history of socio-cultural theorists that language development is a collaborative process in which infants construct meaning out of shared activities with members of their communities, most notably their parents. Infants communicate their interests through gaze, object exploration, gestures, and vocalizations; parents respond to these signals with words and actions; and infants benefit from their parents' responsiveness by learning words for the objects and activities that surround them.

Here, we focus on the role of parental responsiveness in infant language development and thereby contribute to the view that early word learning is an emergent product of cognitive, attentional, and social factors (Hall & Waxman, 2004; Hollich et al., 2000). Our definition of responsiveness emphasizes parents' prompt and contingent replies to infants' exploratory and communicative actions (e.g., Bornstein, Tamis-LeMonda, Hahn, & Haynes, 2008). Responses are "prompt" when they follow infant action within a brief time window, and responses are "contingent" when they are conceptually dependent on infant action. We begin by presenting empirical evidence on the facilitative role of responsiveness for infants'

emerging language. We then ask, "Why do infants benefit from responsive language partners?" and offer a process-based understanding of early language development in social context.

Responsiveness and Early Language Development

Parents' responsiveness promotes infants' communicative skills well before infants produce conventional words. For example, researchers have documented real-time changes in the sophistication of infants' babbling following maternal responsiveness. In one study, infants were randomly assigned to a contingent-feedback condition (i.e., mothers were instructed to verbally respond to their infants' babbling) or a noncontingent-feedback condition (i.e., mothers' verbal input was temporally dissociated from their infants' babbling; Goldstein & Schwade, 2008). Infants in the contingent condition modified their babbling to mirror the phonological structure

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of their mothers' input, whereas infants in the noncontingent condition did not. In another study, mothers' responses to their 9-month-old, prelinguistic infants' emotional displays predicted infants' language at 21 months (Nicely, Tamis-LeMonda, & Bornstein, 1999).

In the second year, when infants begin to understand and produce words and simple phrases, responsiveness predicts the sizes of infants' vocabularies (Tamis-LeMonda, Bornstein, Kahana-Kalman, Baumwell, & Cyphers, 1998), the diversity of infants' communications (Beckwith & Cohen, 1989), and the timing of language milestones (Tamis-LeMonda, Bornstein, & Baumwell, 2001; Tamis-LeMonda et al., 1998). Moreover, the magnitude of these influences is impressive. In a set of studies, infants' vocabulary growth was tracked from 9 to 21 months and mothers' responsiveness was coded from video-recorded infant-mother interactions. Infants of high-responsive mothers (90th percentile) at 9 and 13 months achieved language milestones such as first words, vocabulary spurt, and combinatorial speech, 4 to 6 months earlier than infants of low-responsive mothers (10th percentile; Tamis-LeMonda et al., 2001; Tamis-LeMonda et al., 1998).

Fathers' responsiveness also predicts infants' language development. In one study, fathers' responsiveness to their 2-year-olds predicted children's communicative skills. Toddlers of low-responsive fathers were 5 times more likely to display cognitive delays than were toddlers of high-responsive fathers (Shannon, Tamis-LeMonda, London, & Cabrera, 2002). In another study, fathers' responsiveness to their 2- and 3-year-olds predicted toddlers' cognitive and language abilities within and across time, even when controlling for mothers' responsiveness (Tamis-LeMonda, Shannon, & Cabrera, 2004).

Moreover, the benefits of responsiveness are not merely epiphenomena of genetic heritability. Parental responsiveness relates to the language skills of adopted children (Stams, Juffer, & van IJzendoorn, 2002), predicts infant learning under laboratory manipulations (Goldstein, King, & West, 2003), and enhances children's language skills in interventions that target responsiveness (e.g., Landry, Smith, Swank, & Guttentag, 2008). What processes might account for these associations?

Mechanisms of Influence

Early language development involves growing skills in pragmatics and semantics. Infants must come to appreciate that language is a tool that enables humans to share intentions with others (Bruner, 1983); this includes learning the norms of social discourse, such as when, to whom, and under what conditions to speak. These early gains in pragmatics are foundational to semantic development, or learning that language "has a sense" and that words map to referents in the real world (Bruner, 1983).

Responsiveness and pragmatics

Intersubjectivity is a hallmark of mature language (Grice, 1968). It reflects the speaker's intention to communicate and the expectation that the listener will take in just the sense that was intended (Bruner, 1983, 1984). The appreciation of communicative intentionality, or *secondary intersubjectivity* (e.g., Rochat & Striano, 1999), emerges around the end of the first year, and it can be distinguished from the *primary intersubjectivity* evidenced in the rhythmic turn-taking of infant-mother interactions during the postnatal period (Trevvarthen, 2011) and the imitative behaviors of neonates (Meltzoff & Moore, 1977).

The distinction between primary and secondary intersubjectivity is theoretically important because mechanisms that underlie earlier forms of intersubjectivity may differ from those that underlie later forms. Thus, although there has been continued philosophical debate about whether primary intersubjectivity reflects infants' "innate" awareness of self and other (e.g., see Trevvarthen, 1979, for a nativist argument and Welsh, 2006, for counterclaims), the view here is that interactions with responsive caregivers facilitate secondary intersubjectivity. That is, infants do not come to the world equipped with awareness of their own and others' intentions; they do not inherently understand that language is a tool for sharing intentions; and they do not necessarily harbor expectations that their parents will respond to their behaviors. Rather, secondary intersubjectivity emerges out of everyday interactions: Infants act on their worlds, parents respond, and infants come to understand the intentionality of social interactions (Tamis-LeMonda, Kuchirko, & Tafuro, 2013).

In turn, infants' development of secondary intersubjectivity enormously expands possibilities for learning language. As infants grow in their appreciation that meanings are socially shared, they engage in actions that allow them to capitalize on adult knowledge (Tamis-LeMonda et al., 2008). They look where adults look, reference adults in ambiguous situations, and use gestures and words to share experiences (Tomasello, 1995). These behaviors are salient to parents, who reliably respond with descriptions, labels, questions, and action directives (Bornstein et al., 2008; Karasik, Tamis-LeMonda, & Adolph, in press). Thus, parental responsiveness yields benefits for social cognitive skills that support language learning over time.

Responsiveness and semantics

A major challenge to learning language is figuring out which words map to which objects or events in the world (semantic development). This task of referent mapping requires infants to parse auditory (Saffran, Aslin, & Newport, 1996) and visual streams (Baldwin, Baird,

Saylor, & Clark, 2001) into meaningful units, isolate the relevant object or event in a visually cluttered environment (Yu, Smith, Shen, Pereira, & Smith, 2009), and somehow deduce that the visual and auditory events belong together. Fortunately, language learning is socially embedded, and three characteristics of responsiveness increase the odds that infants will learn new words. First, responsive behaviors are *contiguous* (temporally connected) and *contingent* (conceptually dependent) on infant actions. Second, responsive behaviors are *didactic* (informative) and *embodied* (multimodal). And third, responsive behaviors are attuned to and *scaffold* infants' development. Collectively, these features of responsiveness provide a perspective of language development that unites an information-processing account of word learning, in which time-locked input facilitates infants' computational strategies, with a social-interactive account, in which children are motivated by, attend to, and benefit from interactions with attuned, dynamic social partners (Kuhl, 2007).

Contiguity and contingency. Contiguity and contingency refer to the temporal and conceptual codependencies between infant action and parent response. By definition, contiguous responses are temporally linked to infant action. This tight temporal connection is critical for infant learning, given that the likelihood that two events will come to be associated depends on their co-occurrence within a brief time window (Rovee-Collier, 1995). New information encountered after a time window has closed is not associated with the initial event. Temporal contiguity is particularly important during early language development, when infants' knowledge base is just beginning to be established.

However, contiguity alone is insufficient for word learning because infants encounter an abundance of irrelevant information at any point in time (Yu et al., 2009). Infants often hear words that are not the target of their attention—for example, the conversations of people around them—yet are impressively capable of resolving referential ambiguity by around the end of the first year (Smith & Yu, 2008). Psychologists have appealed to statistical learning models—that is, the idea that infants are sensitive to the probabilities of specific stimuli (words) co-occurring with other stimuli (objects and events)—to explain infants' exquisite accuracy at word-to-world mappings (Smith & Yu, 2008). Infants detect environmental contingencies early in development (Dunham & Dunham, 1995), possess powerful computational skills to advance language learning (Kuhl, 2004; Saffran, 2003), and are continually calculating and updating these likelihoods across situations (Smith & Yu, 2008; Yu, 2008).

For example, the probability of hearing the word “apple” in the presence of an apple will be higher than the likelihood of hearing the word “orange” in the

presence of an apple. Infants as young as 8 months can rely on statistical regularities to parse words in artificial and natural languages (Pelucchi, Hay, & Saffran, 2009). In this regard, responsive language facilitates statistical learning by heightening the odds that infants will hear words for the objects and events that are most salient to them.

Indeed, mothers are more likely to label objects when infants are looking at those objects than when infants are looking elsewhere. For example, mothers were assessed on their responses to their 14-month-olds' object exploration. Mothers were more likely to use language in response to infant object exploration (within 3 seconds of infant action) than in the presence of infant off-task behavior (Tamis-LeMonda, Kuchirko, & Tafuro, 2013). Similar patterns were seen for mothers' use of language following infant gestures and vocalizations (Tamis-LeMonda, Tafuro, Kuchirko, Song, & Kahana-Kalman, 2013). Infants, in turn, benefit from contingent language: They are more likely to learn words for objects that dominate their visual fields than to learn words that refer to objects during less visually salient moments (Yu & Smith, 2012).

Didactics and embodiment. Didactics and embodiment characterize the available information contained in parents' responses. When parents respond to infants, they are more likely to use *didactic language* that labels, describes, and asks about objects or events than to use less informative language, such as prohibitions. In one study, mothers' verbal responses were coded as *referential* (i.e., references to objects or events; e.g., “Pink bunny”) or *regulatory* (i.e., statements that direct infants' actions; e.g., “Sit there”). As expected, mothers' referential language increased following infant vocalizations, gestures, and object exploration, whereas regulatory language decreased in the presence of those actions (Tamis-LeMonda, Kuchirko, & Tafuro, 2013; Tamis-LeMonda, Tafuro, et al., 2013). Referential language is comparatively high in lexical diversity (i.e., number of different words), which promotes infant vocabulary growth (Song, Spier, & Tamis-LeMonda, 2013).

Parents' responses are *embodied* in that parents reply to infant behaviors with multimodal input; they naturally coordinate verbal and physical cues—for example, by simultaneously labeling, looking to, and touching or pointing to objects following infant object engagement (Tamis-LeMonda, Kuchirko, & Tafuro, 2013). Moreover, mothers are more likely to coordinate physical cues of reference with didactic language than with regulatory language in response to infants' exploratory or communicative actions. In turn, infants are able to capitalize on nonspeech contextual information when learning words (Yu, Ballard, & Aslin, 2005). Body movements, gesture, exaggerated actions (termed *motionese*; Brand & Shallcross, 2008), and prosodic features of speech

(Fernald & Mazzie, 1991) are associated with heightened infant attention and learning. Thus, infants' everyday behaviors elicit parental responses that are rich in content and paired with physical behaviors that signal the targets of talk.

Scaffolding. Scaffolding refers to parents' modifications of responses in line with infants' learning and development. The value of any given response depends on the skill level of the child it is directed toward. For example, contingent labeling ("Ball!") will yield greater benefit to an infant who does not know the word "ball" than to one with a relatively large vocabulary. Indeed, parents attune to the changing skills of their infants.

In one study, mothers responded with simple labels and descriptions to the vocalizations of their 1-year olds, but increased their responsive questions across the second year as their infants became more skilled at language (Bornstein et al., 2008). Mothers also shifted from responding to simple object exploration at 9 months to responding to sophisticated forms of object play at later ages. Mothers are more likely to respond to novel words spoken by their 2-year-olds than to words that their infants have spoken for some time (Masur, 1997). Mothers increase their referential responses to infant vocalizations when their infants are between the ages of 14 and 24 months but decrease their responses to their infants' gestures (Tamis-LeMonda, Tafuro, et al., 2013). Finally, mothers of crawling infants respond differently to the social bids of their 13-month-olds than do mothers of walking infants, largely because the two groups of infants bid in different ways: Crawling infants predominantly bid from stationary positions (e.g., while sitting), whereas walking infants bid from stationary positions but also frequently carry objects over to mothers (Karasik, Tamis-LeMonda, & Adolph, 2011). Mothers, in turn, respond to stationary bids with noun phrases (e.g., "Book!") but to moving bids with predicate phrases (e.g., "Want to read?"; Karasik et al., in press). Collectively, these studies indicate that parents "up the ante" by responding in new ways to emerging skills in infants.

The Cultural Context

Responsiveness is observed in parents around the world. Moreover, although parents from different cultural communities might differ in how often they respond to their infants, there is evidence that when they do respond, the characteristic features of responsiveness (continuity, contingency, and embodiment) are universal.

Nonetheless, parental responsiveness is culturally embedded. Thus, parents' views and socialization goals and the larger socio-cultural context shape which behaviors parents respond to and how they respond. These cultural variations might reflect differences in parents'

accommodations to infant communication and in the salience of different infant signals to parents (Ochs & Schieffelin, 1984; Tamis-LeMonda & Song, 2012).

For example, Japanese and U.S. mothers differ in how often they respond to the gazes, smiles, and vocalizations of their 3-month-olds (Fogel, Toda, & Kawai, 1988). In a study of six cultural communities, mothers from Berlin and Los Angeles were more likely to respond to infant nondistress vocalizations and gazes than were mothers from Beijing and Delhi and Nso mothers from various cities in Cameroon (Kärtner et al., 2008). In contrast, Nso mothers responded more often to infant touch than did mothers from other cultures. In another study, U.S. mothers responded to infant object play more than social play, whereas Japanese mothers responded more to social play (Tamis-LeMonda, Bornstein, Cyphers, Toda, & Ogino, 1992). In a study of mothers from New York City, Mexican immigrant mothers were more likely to respond to their 14-month-olds' gestures with referential language than were Dominican or African American mothers (Tamis-LeMonda, Tafuro, et al., 2013). Again, however, in the context of these differences, mothers from all cultural communities displayed contiguity, contingency, and embodiment in their responses.

Parents from different cultural communities also differ in their types of responses. Mothers of 5-month-olds from France, Japan, and the United States differed in their *extradyadic* (directing infant attention to the environment) and *dyadic* (directing attention to mother) responses. The U.S. mothers were more extradyadic in their responsiveness than were French and Japanese mothers, whereas Japanese mothers were more dyadic in their responsiveness than were other mothers (Bornstein et al., 1992). These patterns of responding may reflect different cultural emphases on self-guided exploration (extradyadic) versus connection to others (dyadic).

Nonetheless, differences in types of responsiveness across communities do not imply differences in the *associations* between responsiveness and infant learning, because averages are statistically independent of correlations. In fact, the value of parental responsiveness for children's language development generalizes across families from different cultural communities and socio-economic strata (Rodriguez & Tamis-LeMonda, 2011; Shannon et al., 2002; Tamis-LeMonda et al., 2001; Tamis-LeMonda et al., 2004), suggesting universality in social-learning processes.

Conclusions

Responsiveness is a common characteristic of parenting around the world, and its benefits extend to children from families that differ in genetic relatedness, socio-cultural beliefs and practices, and income strata. In this essay, we have proposed various mechanisms through

which responsiveness facilitates infants' language development. Responsiveness feeds into infants' pragmatic understanding that meanings can be shared. The temporal characteristics of responsiveness—namely, its contiguity and contingency—increase the likelihood that the words infants hear will be bound to their real-world referents. The didactic and embodied content of responsiveness means that infants are the serendipitous beneficiaries of lexically rich multimodal input that marks topics of conversation. Finally, responsiveness is embedded in reciprocal feedback loops: Parents scaffold infant learning by adapting their language and behaviors to accommodate the developing skills of their infants.

Recommended Reading

- Davis, D., & Cynthia Logsdon, M. (Eds.). (2011). *Maternal sensitivity: A critical review for practitioners*. Nova Science Publishers. A clearly written, comprehensive edited volume that contains chapters on research conducted on maternal responsiveness (often referred to as sensitivity) from leading scholars in the field.
- Eshel, N., Daelmans, B., Cabral de Mello, M., & Martines, J. (2006). Responsive parenting: Interventions and outcomes. *Bulletin of the World Health Organization*, *84*, 992–999. A reader-friendly review of studies on interventions in developed and developing countries that have targeted responsiveness and improved various health outcomes in children.
- Landry, S. E., Smith, P. R., & Swank, K. E. (2006). Responsive parenting: Establishing early foundations for social, communication, and independent problem-solving skills. *Developmental Psychology*, *42*, 627–642. A clearly written study conducted with mothers of full-term and preterm infants that demonstrates the effectiveness of responsiveness interventions for children's development across a range of areas.
- Tamis-LeMonda, C. S., & Bornstein, M. (2002). Maternal responsiveness and early language acquisition. In Reese & L. Kail (Eds.), *Advances in child development and behavior* (Vol. 29, pp. 89–127). A comprehensive chapter on the role of responsiveness in language development.

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