Reciprocity between maternal questions and child contributions during book-sharing

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ABSTRACT

We examined reciprocal associations between maternal questions and children's narrative contributions during book-sharing. Participants were 235 U.S. mothers and their 4-year-old children from low-income, African American, Dominican, Mexican, and Chinese backgrounds. Maternal questions and child narrative contributions were coded for their cognitive level and contingency. For example, the question "What's that?" was coded as a basic referential question and the question "What will happen next?" was coded as a more advanced inferential question. Contingency was indicated when child contributions preceded (child-to-mother sequence) or followed (mother-to-child sequence) maternal questions at likelihoods greater than chance. Across all ethnic groups, maternal questions and child contributions were contingent on one another, with the magnitudes of mother-to-child effects being larger than child-to-mother effects. Children's responsive contributions and mothers' responsive questions were matched in their cognitive level. Children actively shape the inputs they receive during book-sharing interactions, and in turn benefit from questions at different cognitive levels.

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1. Introduction

Parent-child book sharing is an important context in which preschool children develop language and literacy skills (Adams, 1990). During book sharing, parents provide children with rich language input, and invite children to practice language and narrative skills (Arnold, Lonigan, Whitehurst, & Epstein, 1994; Bus, 2003). In particular, parental questions "push learners to process language more deeply – with more mental effort" (Swain, 2000; p. 99) than do statements, and thus have been considered a key component of high-quality book-sharing interactions. Parents' dialogic reading – encouragement of child participation through frequent question use – facilitates children's narrative and language development and school readiness skills (Aram, Fine, & Ziv, 2013; Cristofaro & Tamis-LeMonda, 2012; Melzi, Schick, & Kennedy, 2011; Sénéchal, 1997; Whitehurst et al., 1988, 1994).

There is some evidence that the types of questions mothers ask matter: Associations between maternal questions and child contributions depend on the cognitive demands of questions (Danis, Bernard, & Leproux, 2000; Kuchirko, Tamis-LeMonda, Luo, & Liang, in press; Lee & Kinzie, 2012; Zucker, Justice, Piasta, & Kaderavek,

2010). For example, referential questions that ask about objects and their characteristics (e.g., "What is that?", "What color is that?") are likely to elicit descriptions or labels from children, whereas inferential questions (e.g., "Why is he sad?", "What will happen next?") are likely to elicit elaborative responses that require reasoning; these latter types of questions are found to support children's language and cognitive skills (de Rivera, Girolametto, Greenberg, & Weitzman, 2005; Lee & Kinzie, 2012).

To the extent that different types of questions promote different narrative contributions by children, there is a need to understand the reciprocal processes that underlie these associations. Most studies have interpreted associations between maternal questions and child contributions as a "parent effect", overlooking the active role that children play in their book-sharing experiences. Moreover, most researchers take a correlational approach, which fails to capture the temporal features of book-sharing interactions and consequently reveals little about the direction of effects. Child contributions might elicit questions from mothers, mother questions might elicit contributions from children, and/or talkative mothers might simply have talkative children, without there being any temporal contingency between the partners' contributions. Research is needed on the ways that maternal questions and child contributions unfold and affect one another in real time.

The current study examined book-sharing interactions between 4-year-old children and their mothers. Sequential analysis

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(Bakeman & Quera, 2011) was used to examine the likelihoods that maternal questions at different cognitive levels would be followed by child contributions at different cognitive levels, and vice versa. The generalizability of these bidirectional processes was examined across cultural communities, in U.S. mother-child dyads from low-income, African American, Dominican, Mexican, and Chinese backgrounds.

1.1. The cognitive continuum of maternal questions

Cognitive distancing theory suggests that questions can lie along a cognitive distancing continuum (Sigel, 1993). Low-cognitive-demand questions ask about concrete information in the here and now (Blank, Rose, & Berlin, 1978; van Kleeck, Gillam, Hamilton, & McGrath, 1997). At the basic level are *referential questions*, which ask children to label or describe an object or event (e.g., What's this? What color is it?). At a moderate level of complexity are questions that ask about *behaviors* (e.g. What is the boy doing?). These questions require children to refer to actions and relations among characters or objects that are not directly observable, thereby moving beyond the concreteness of referential questions. Finally, high-cognitive-demand questions, also referred to as *inferential* questions (e.g., What will happen next? How does the little girl feel?), focus on explanatory, evaluative, and imaginary information that extends beyond the text or pictures in a book (Blank et al., 1978; van Kleeck et al., 1997). High-cognitive-demand questions require children to think abstractly, and often result in grammatically complex sentence structures (Danis et al., 2000).

1.2. Bidirectional associations

Samroff's (2009) transactional model emphasizes the dynamic and bidirectional process of social interaction, in which participants mutually influence one another during interactions that change over time. Although few studies have directly examined the extent to which different levels of maternal questions elicit different levels of child contributions, prior work on teacher-child interactions found that high-cognitive-demand questions elicited more sophisticated child responses than did low-cognitive-demand questions. For example, teachers' questions and 4-year-old children's statements during book-sharing were coded at 4 levels of cognitive demand, from matching of perception to reasoning about perception. Teachers' questions were more likely to elicit child contributions at the same cognitive level than what would be expected by chance (Zucker et al., 2010). Preschoolers also responded to teachers' open-ended questions (questions that cannot be answered by a yes or no response; a relatively high cognitive level) with more varied vocabulary and longer and more complex sentences than they did when they answered close-ended questions (questions that could be answered by a yes or no response; a relatively low cognitive level; Lee & Kinzie, 2012; de Rivera et al., 2005).

Moreover, there is little research on whether mothers' question use is affected by children's prior contributions. There is some evidence that mothers change their questions based on children's age and language skills (Pellegrini, Brody, & Sigel, 1985; van Kleeck & Beckley-McCall, 2002), suggesting that children might drive their own experiences. For example, mothers asked more questions requiring a verbal response as children advanced in their language skills from infancy to preschool (Sénéchal, Cornell, & Broda, 1995).

Developmental changes in mothers' question types highlight children's active role in book-sharing, yet do not closely reveal the bidirectional processes and temporal features of real-time interactions. Presumably, mothers ask more questions as children become more capable of contributing to language interactions, with these moment-to-moment changes resulting in developmental changes over extended time frames. There is one seminal study, to our knowledge, in which the temporal structure of mother-child book-sharing interactions were investigated: Mothers' "what" and "where" questions and 19-month-old infants' labeling and pointing responses were coded (Ninio, 1983). Mothers were more likely to ask "what" and "where" questions after infants produced correct responses than when infants responded incorrectly or did not respond.

1.3. Book-sharing interactions in low-income, ethnically diverse families

Children from low-income families are at risk of delays in early language and literacy development (Hart & Risley, 1995), making the study of book-sharing interactions in these populations of special interest. Additionally, the increasing ethnic diversity in the United States (Suárez-Orozco, Yoshikawa, & Tseng, 2015) underscores the need for research on the literacy interactions of children and mothers from different backgrounds. In the current study, we described the temporal features of book-sharing interactions in low-income families from African American, Dominican, Mexican, and Chinese backgrounds.

These four ethnic groups differed in mothers' cultural beliefs, immigration history and linguistic backgrounds, and children's language skills. African American mothers, who were uniformly 3+ generation U.S. citizens, tended to endorse the individualistic values of independence, personal preference, and self-expression (Shulruf, Hattie, & Dixon, 2007; Singelis, 1994; Tamis-LeMonda & McFadden, 2010). In contrast, Chinese, Dominican, and Mexican immigrant mothers shared the collectivistic values of social hierarchy, social norms, and children's obedience (Ho, 1986; Park & Chesla, 2007; Ramirez, 1991; Valdeís, 1996; Wang & Tamis-LeMonda, 2003; Zayas & Solari, 1994). Nonetheless, these three immigrant groups differed in their exposure to mainstream U.S. culture. Among the three groups, Chinese mothers had spent the fewest years living in the United States, whereas Dominican mothers had spent the most years living in the United States, with Mexican mothers falling in the middle. Additionally, almost all Chinese and Mexican mothers spoke Chinese/Spanish as their primary language, compared to 55% of Dominican mothers. Finally, African American children in the current sample outperformed Chinese and Mexican children in narrative skills at age 5, with Dominican children falling in the middle (Luo, Tamis-LeMonda, Kuchirko, Ng, & Liang, 2014).

Previous studies have demonstrated ethnic and cultural differences in multiple aspects of mother-child book-sharing interactions, including how often mothers shared books with children (Raikes et al., 2006), how much information mothers provided during book-sharing (Luo et al., 2014), which aspects of the story mothers focused on (Doan & Wang, 2010; Luo et al., 2014; Wang, Leichtman, & Davies, 2000), and the extent to which mothers invited children to contribute to book-sharing interactions (Melzi & Caspe, 2005). In particular, mothers' question use varies across different ethnic and cultural communities (Heath, 1982; Melzi & Caspe, 2005). The majority of research in this area has compared ethnic minority groups with European American samples. Uniformly, this work indicated that African American and Latino mothers asked fewer questions during book-sharing than did their European American counterparts, even within the same socio-economic strata (Anderson-Yockel & Haynes, 1994; Caspe, 2009; Hammer, 2001; Melzi & Caspe, 2005; Melzi et al., 2011). Ethnic differences have also been seen in the content of maternal questions. In two studies of memory sharing, middle-class Chinese mothers tended to use factual questions to "test" children's memory, whereas European American mothers were likely to ask children to provide new information (Kulkofsky, Wang, & Koh, 2009; Wang