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A longitudinal study of maternal interaction strategies during joint book-reading in Taiwan

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(Received 1 September 2018; revised 29 April 2019; accepted 23 August 2019;
first published online 6 December 2019)

Abstract

This longitudinal study examines change in maternal interaction strategies in Taiwanese mothers across time, and the synchronic and diachronic relationships between maternal interaction strategies and children's language and early literacy skills. Forty-two mother-child dyads participated in this study. Their interactions during joint book-reading were tape-recorded, transcribed, and analyzed when the children were fourteen, twenty-six, and thirty-six months of age. The children received a battery of language and early literacy tests when they were thirty-six months old. Findings showed that Taiwanese mothers adjusted their use of interaction strategies as their children grew. Maternal use of description, performance, prediction inference, and print-related talk were positively correlated with their children's language and literacy skills. Significant negative correlations were found between use of task-behavioral regulation strategy and text reading in mothers and their children's language performance. This study suggests that age-appropriate interaction strategies are important for children's language and early literacy development.

Keywords: children; Chinese; early literacy; joint book-reading; mother-child interaction

Introduction

Joint book-reading interactions between parents and their young children

Joint book reading is a highly ritualized form of parent-child interaction that involves complicated language exchange between parents and their children (Snow *et al.*, 1976; Snow & Goldfield, 1983; Snow, Perlmann, & Nathan, 1987; Sorsby & Martlew, 1991). It is an activity which is often viewed as a medium that is optimal in examining parental scaffolding strategies and the process of social learning in young children (Bruner, 1986; Vygotsky, 1978). This is the first longitudinal study that aims to examine mother-child joint book-reading interactions in Taiwan, with a special focus on the change in maternal interaction strategies across time, and the effects of maternal interactions on children's language and early literacy skill at age three.

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There are many studies on parent–child joint book-reading interactions in Western countries, especially in North America. For example, Ninio and Bruner (1978) investigated the interactions between an eight-month-old infant and his mother during joint book-reading and followed up with this mother–child pair for ten months. The mother was observed to use ritualized dialogues, which involve getting the attention of the child, requesting information from the child, providing labels, and giving feedback to the child during parent–child interactions. Subsequent studies (e.g., Bus & van Ijzendoorn, 1997; DeLoach & DeMendoza, 1987; De Temple, 2001; Dickinson, De Temple, Hirschler, & Smith, 1992; Ninio, 1980, 1983; Rowe, 2013; Snow, Tabors, & Dickinson, 2001; van Kleeck, Alexander, Vigil, & Templeton, 1996; Wheeler, 1983) on parent–child joint book-reading interactions across different age-groups of children have found that mother–child interaction patterns change as children grow older and possess better language skills. While reading books to infants who are passive and not yet capable of verbal production, mothers would usually label objects (Ninio, 1980, 1983) and would not request feedback or participation from the children (Bus & van Ijzendoorn, 1997). When children are non-verbal but active and able to show referencing during joint book-reading, mothers would ask ‘where’ questions and children would respond with pointing (Bus & van Ijzendoorn, 1997; Ninio, 1980, 1983). When children are capable of verbal communication, mothers would request information from the children by asking ‘what’ or ‘why’ questions (Ninio, 1980, 1983). Wheeler (1983) examined 10 mothers reading picture-books with their children at three time-points. Each mother had two children, one younger child from age 1;5 to 1;10 and the other older child from age 3;5 to 5;0 at Time 1, who read with their mother separately each time. Wheeler found that the mothers were ‘fine-tuned’ to their children’s verbal abilities. They mentioned only single major elements of pictures when their children were about one year old, but they added more elements in one utterance as the children grew. Moreover, Sénéchal, Thomas, and Monker (1995) found that parents used more attention-getting strategies and provided more elaborations when reading to younger children, but asked more questions and provided more feedback to older children during shared book-reading. Snow and her colleagues observed talk during book-reading between parents and children from low-income families when the children were three, four, and five years old (De Temple, 2001; Snow *et al.*, 2001). They found that mothers produced a smaller amount of immediate talk (such as attention getter, labeling, fill-in-the-blank strategies, etc.) and relatively more non-immediate or decontextualized talk (such as inference, prediction, general knowledge, etc.) as the children grew older. Rowe (2013) also noted an increase in use of decontextualized talk when mothers read to their children over time. All these studies have demonstrated that mothers are sensitive to their children’s age and abilities, and they would not request participation when their children were unable to perform.

Relationships between joint book-reading and language and early literacy development in young children

Past research in Western societies has shown that joint book-reading experiences are linked to children’s language and literacy proficiencies as well as to their later academic achievement (e.g., Anderson, Hiebert, Scott, & Wilkinson, 1985; Barnes & Puccioni, 2017; Bus, van Ijzendoorn, & Pellegrini, 1995; De Temple & Tabors, 1996;

Mol & Bus, 2011; Raikes *et al.*, 2006; Rowe, 2013; Scarborough & Dobrich, 1994; Sénéchal, 2006; Shahaeian *et al.*, 2018). For example, according to the meta-analyses conducted by Bus *et al.* (1995), joint book-reading explains about 8% of the variance in children's language skills (Cohen's $d = .67$), emergent literacy (Cohen's $d = .58$), and reading achievement (Cohen's $d = .55$). Sénéchal (2006) explored the joint book-reading experiences of 90 French-speaking children in Canada. She found, after controlling for parent education level, that parent book-reading is related to children's vocabulary in kindergarten and reading comprehension skills in Grade 4. Raikes and her colleagues (2006) examined joint book-reading practices in low-income families across three time-points and also found that the language and cognitive abilities of children measured at 36 months could be predicted by maternal daily reading over the three time-points (14, 26, 36 months). Through these studies, the potential benefits of frequent story-book exposure at home and repeated parent-child joint book-reading practices on the language and literacy development of young children were supported.

Nevertheless, past studies also reported that not all joint book-reading practices are good for promoting children's literacy development, and the effectiveness of shared book-reading is not as strong as children grow (e.g., Justice & Piasta, 2011; Lonigan, Shanahan, & Cunningham, 2008; Mol, Bus, de Jong, & Smeets, 2008; Pentimonti, Justice, & Piasta, 2013; Raikes *et al.*, 2006; Wasik, Hindman, & Snell, 2016). For example, Lonigan *et al.* (2008) examined the impacts of 19 shared book-reading intervention studies that used randomized control trial or quasi-experimental design on children's language and early literacy skills. They found moderate effects of share book-reading on children's oral language skills and print knowledge, but no effect between shared book-reading and children's early literacy skills, such as alphabet knowledge or phonological awareness. Mol *et al.* (2008) conducted a meta-analysis of 16 studies which focused on the added value of dialogic parent-child book-readings on children's language outcomes. Consistent with what Lonigan *et al.* (2008) observed, they also found a moderate effect size (Cohen's $d = .59$) of interactive book-reading on children's expressive vocabulary, but the effect size decreases when children get older (four to five years old). Bus *et al.* (1995) also found that the effect of frequency of joint book-reading on emergent literacy becomes smaller once children learn to read by themselves.

Certain parent-child joint book-reading interaction strategies were identified by past research as either facilitating or hindering language and literacy development in young children. When reading books with their two-year-olds, Finnish mothers who used more complex expansions and questions had children with more developed, concurrent, and subsequent language skills (Silven, Ahtola, & Niemi, 2003). In contrast, the extensive use of labeling strategies by Finnish mothers was related to slower or delayed language development in their two-year-olds. Similarly, Hindman, Connor, Jewkes, and Morrison (2008) have found an inverse relationship between contextualized talk (such as labeling and description) and the vocabulary skills of American preschoolers. On the other hand, a number of studies found that the use of decontextualized talk (such as inference, prediction, general knowledge, narration about past or future events, etc.) during joint-book reading promotes the development of language skills (Britto & Brook-Gunn, 2001; De Temple, 2001; Rowe, 2013; Snow *et al.*, 2001). For example, Rowe (2013) found that mothers who produced more narrative or explanation talk during book-reading had children who scored higher in language measures. Mothers' use of complex expansions and

open-ended questions also promotes children's concurrent and subsequent language and literacy development (Silven *et al.*, 2003). In addition, research on the use of non-verbal and verbal print referencing strategies during shared book reading, such as pointing or talk about book and print knowledge, suggests positive relationships between exposure to print referencing and children's language, print concepts, letter-word identification, word recognition, and passage comprehension skills (Chang, Luo, & Wu, 2016; Chen & Chang, 2011, 2013; Justice & Ezell, 2000; Justice & Piasta, 2011; Lovelace & Stewart, 2007; Piasta *et al.*, 2010). All of these studies have pinpointed some specific parent-child interaction strategies that have potential influences on the language and early literacy development of young children.

However, are these interaction strategies beneficial to the language learning process in children at any given age? Or, perhaps, are certain interaction strategies only good for children of a certain age or at a specific stage of language development? To answer these questions, a close examination of parent-child interactions with a group of toddlers at the beginning and later stages of language development in a longitudinal study is required.

Joint book-reading between parents and their young children in Taiwanese families

Mothers in different cultures might use joint book-reading for different purposes, and have distinctive styles while interacting with their children during joint book-reading (Chang & Huang, 2016; Kato-Otani & Chang, 2005; Luo, Snow, & Chang, 2012; Murase, Dale, Ogura, Yamashita, & Mahieu, 2005; Wu & Honig, 2010). Kato-Otani and Chang (2005), for example, found that Japanese, Taiwanese, and American mothers had different beliefs about the advantages of joint book-reading. Japanese mothers regarded joint book-reading as a medium to cultivate children's imagination and enjoyment of books, while Taiwanese and American mothers regarded joint book-reading as a medium for learning new vocabulary and promoting literacy skills. American mothers were more likely to regard joint book-reading as a tool to facilitate vocabulary learning and language development as well as to promote positive parent-child relationships than Taiwanese mothers did. Similar results were identified by Wu and Honig (2010) from their comparison of the purposes and beliefs regarding the utilization of joint book-reading in Taiwanese and American families. Luo *et al.* (2012), who observed mother-child interactions during joint book-reading in American and Taiwanese families, also found that, compared to American mothers, Taiwanese mothers stress moral values and proper conduct more when they read the book *The Very Hungry Caterpillar* with their children. Talk about moral lessons and behavioral regulations was also found in Chinese mother-child conversations about the past, in comparison to American families (Fung, 1999; Fung, Miller, & Lin, 2004; Miller, Wiley, Fung, & Liang, 1997). Parent-child joint book-reading interaction strategies observed in Western countries, therefore, might not be generalizable to those in non-Western countries. Further studies of parent-child joint book-reading interaction styles in Taiwanese families should be conducted to clarify the differences. Also, acknowledging variation in interaction strategies across cultures, it is important to understand whether or not the effects of joint book-reading on English-speaking children are equally applicable to those who come from different linguistic and cultural backgrounds.

Compared to the number of longitudinal studies on Western families regarding parent–child joint book-reading interactions, there are only a few studies that investigate Taiwanese parent–child joint book-reading interactions (Chang & Huang, 2016; Chang & Lin, 2006; Chang *et al.*, 2016; Lee & Chang, 2018; Lin, 2006; Luo *et al.*, 2012; Wu & Honig, 2013). Moreover, the participants observed in most of these studies are children older than three years. According to the joint statement made by the International Reading Association (IRA) and the National Association for the Education of Young Children (NAEYC), it is important to examine joint book-reading interactions between parents and children younger than three years old (Neuman, Copple, & Bredekamp, 2000). Research on joint book-reading interactions between Taiwanese mothers and children younger than three years old, however, is sparse (Chang *et al.*, 2016; Lee & Chang, 2018; Lin, 2006). Lin (2006) used questionnaires to collect data regarding the styles and strategies used by parents during joint book-reading, instead of observations of actual parent–child interactions. In addition, Lin provided only five strategies for parents to choose from among the large numbers of possible strategies that parents could use during joint book-reading. Furthermore, the reading strategies indicated on the questionnaire have been described vaguely. For example, one of the strategies on the questionnaire was “I will provide guidance to my child while reading storybook together”, but ‘guidance’ was not defined in detail on the questionnaire and it is possible that each parent defined ‘guidance’ differently. Systematic and longitudinal observations of joint book-reading interactions between Taiwanese parents and younger children are needed (Chang & Liu, 2011). The current study is the first one that focused on finding the longitudinal changes in verbal interactions when Taiwanese mothers read a picture-book with their young children from 14 months old to 36 months old, and the synchronic and diachronic relationships between Taiwanese maternal joint book-reading interaction strategies and children’s language and early literacy skills.

Research questions

This study follows a group of 14-month-old Taiwanese children and their mothers who have been regularly engaging in joint book-reading for three years to investigate the influences of the use of interaction strategies by mothers during joint book-reading on the language and early literacy development of young Taiwanese children. It is hoped that the results of this study can increase our understandings of the language and early literacy development process of Mandarin-speaking children from their first year to their third year and the home factors that promote such development in this group of children.

This study examines the following three questions: (1) What interaction strategies do Taiwanese mothers use during joint book-reading when their children are 14, 26, and 36 months old? (2) Does mothers’ use of interaction strategies change across time? (3) How are the interaction strategies used by Taiwanese mothers related to the concurrent and subsequent language and early literacy abilities of their children?

Based on past research findings, our first hypothesis is that mothers will adapt their interaction strategies as their children grow. Mothers are likely to request more information and provide more feedback with older children, but provide more labeling and use more attention-getting strategies with younger children. Our second hypothesis is that the interaction strategies used by Taiwanese mothers during joint

book-reading will be related to scores on language and early literacy measures of Taiwanese children obtained concurrently and diachronically. Specifically, we hypothesize that maternal use of non-immediate talk, such as prediction, inference, and evaluation of the story being read, and print-related talk will correlate positively with the language and early literacy development of Taiwanese children.

Method

Participants

Forty-two mother-child pairs (22 boys and 20 girls) participated in this study. All participating children were the first-borns in the family and this was used as a controlling factor. Past research has shown that parents interact differently with their first-born children, both in the amount of time spent and the quality of the interactions, compared to later-born children (Blitchington, 1978; Oshima-Takane, Goodz, & Derevensky, 1996; Oshima-Takane & Robbins, 2003). The mean ages of the mothers and fathers were 34.4 (SD = 3.56) and 36.47 (SD = 3.69) years old, respectively, at the onset of this study. Most participating mothers (73.8%) and fathers (66.6%) had at least a college-level education or equivalent. About half of the participating mothers were housewives. All of the mothers read with their children before they participated in this study.

Procedures

This study visited the 42 mother-child pairs at home when the children were 14 months (Time 1), 26 months (Time 2), and 36 months (Time 3) of age. At each visit, the mother-child pair was asked to read two books and to play with a set of toys together. Mothers were also asked to fill out a set of questionnaires regarding the demographic information of their family, joint book-reading practices at home, and the language and literacy environments provided to the children. In addition, a set of standardized and self-designed instruments measuring children's language and literacy skills were administered to each child at Time 3. All mother-child joint book-reading and toy play interactions were audio- and video-recorded at each home visit.

Recordings analyzed in this study were based on mother-child interactions while reading the book *Smiling* (Shen, 2004). This book was first introduced to each mother-child pair as the assigned book at Time 1, and it was read again at both Time 2 and Time 3. The same book, which served as a controlling factor to ensure better cross-time-point comparison, was read by all mother-child pairs at all three time-points.

Tools

Book

The book *Smiling* is 18 pages long, with large, colorful illustrations. The text of the book is easy to understand and has repeated, predictable patterns in terms of sentence structure and characters. Also, the book includes words that are evaluative, such as 'smiling', 'heavy', 'yummy', etc. These features create the possibilities for decontextualized talk between mothers and children. The text of this book was translated as follows:

Xiao-feng, alone, sat there smiling.
 At this moment, a cat was coming.
 (The cat) saw her (Xiao-feng's) smiling face. (The cat) meowed.
 (The) cat, like Xiao-feng, sat there and smiled.
 Then a dog came.
 (The dog) saw their smiling faces.
 (The dog) barked and barked.
 The dog, like Xiao-feng and (the) cat, sat there and smiled.
 Then a big elephant came with heavy steps.
 (The) elephant, like everyone, sat there and smiled.
 At this moment, mommy came along.
 Wow, everyone (was) smiling!
 "Come, have a cookie."
 "Yummy, Yummy!"

Language and literacy measures

Two language tests (Peabody Picture Vocabulary Test-Revised and Comprehensive Developmental Inventory for Infants and Toddlers-Language Subscale) and two early literacy tests (story comprehension and concepts about print) were used to assess children's language and early literacy abilities. Partial results regarding maternal print referencing strategies and children's print concepts skill were presented in Chang *et al.* (2016).

1. Peabody Picture Vocabulary Test-Revised (PPVT-R). This test was used to assess the receptive vocabulary skill of children. The English version of the PPVT-R was originally created by Dunn and Dunn (1981). In this study, the Chinese version of the PPVT-R was used (Lu & Liu, 1998) and the national norms were established for Taiwanese children in 1988. The test has 125 test questions. Each question is composed of a set of four pictures. During the test, the child has to pick out the correct picture that describes the vocabulary being read by the experimenter.

Comprehensive Developmental Inventory for Infants and Toddlers (CDIIT)-Language Subscale. This is a standardized test with well-established national norms for children aged from 3 to 71 months in Taiwan (Wang, 2004). This test, composed of items assessing cognitive, language, motor, social, and self-management abilities, is widely used in Taiwan to assess the five areas of developmental abilities in infants and toddlers and to identify children with developmental delays or special needs. The Language Subscale, which involves comprehension and expression skill, was used in this study.

2. Concepts about Print Test. This test was originally created by Clay (1985, 1989), later translated into Cantonese (Wu, 2008), and then modified for this study to measure the children's understanding of book and print concepts. Using a special story booklet entitled *Chasing a ball (zhui piquiu)*, the experimenter assessed children's knowledge about book and print concepts, including orientation of the book, direction of reading (e.g., left-to-right, top-to-bottom), features of Chinese characters, function of punctuations, word-sound correspondence, etc. This test is composed of 25 questions, with a total score of 21. For details of this test, see Chang *et al.* (2016).

3. Story Comprehension Test. A picture-book entitled *Guji Guji* (Chen, 2005) was used to assess children's story comprehension abilities. The experimenter read the book with the children and asked them questions as reading took place. Different levels of story comprehension questions were asked, including questions about information immediately available in the book, such as "How many eggs did mother duck hatch?", and questions which require the children to infer, predict, or evaluate the story plot or the characters in the book, such as "What kind of animal did Guji Guji think he was?" "Why could the crocodile hide in the water and not be found?" The total score of this test is 18.

Coding system

This paper focuses on the verbal interaction strategies used by Taiwanese mothers during joint book-reading. The coding unit used in this study is the clause. Definitions of the composite and main codes and their examples taken from actual mother-child conversation are shown as follows (the codes that rarely occurred and were not related to book-reading activity are not reported in the present paper):

1. *Description and performance*: this is a composite code that includes the provision of and request for information about the attributes of objects/people, the events that happened, the location of objects/people in the story, the labeling of objects in the picture-book, the use of onomatopoeia, and the performance of the actions/events that happened in the story. For example (labeling): "What is this?" (onomatopoeia): "Meow~" (child produces cat's meowing).
2. *Non-immediate talk*: this is a composite code that refers to information neither directly tied to the book nor immediately available to the mothers and children. Three sub-categories were included under this code:
 - A. *Expansion*: includes talk about text-reader connection, text-text connection, and the expansion of talk provided by the child. For example (text-reader connection): "Isn't she doing the same thing as your sister?" (Mother points at the child's sister who is also sitting down.)
 - B. *Evaluation*: includes the provision of and request for evaluation and meta-evaluation of the story being read. For example (evaluation): "Little Fong hears that the kitten is meowing and she is very happy."
 - C. *Prediction and inference*: includes the provision of and request for prediction of events that happened in the story and the reasons that were given to explain why certain events or actions occurred in the story. For example (reason & explanation): "Wow! Because everyone is smiling and behaves nicely, her mother gives them cookies, right?"
3. *Print-related talk*: includes the provision of and request for book knowledge, print knowledge, and word meaning and usage during joint book-reading. Book knowledge covers the introduction of the book title, the book cover, the author and the illustrator, and talk on how to open the book, turn the pages, and read the text. For example, "This is the first page". Print knowledge covers the introduction of the shapes and pronunciations of words encountered. For example, "What does this word look like?" Word meaning and usage covers talk about the meanings and usage of Chinese characters or components of Chinese characters in the book. For example, "The word mouth (口 'kou') is for eating".

4. *Task and behavioral regulation*: includes negotiation of task between the mother and the child, regulation of the child's behaviors, request for attention, and diversion of the other interlocutor's attention. For example (task negotiation): "Can we read that one later? OK?"
5. *Response*: includes acknowledgement, clarification, correction, and attention-getting from the mother. For example (request for clarification): "What?"
6. *Text reading*: includes mothers' reading of the text and the request to read the text from the mother. For example: "Little Fong is smiling and sitting all alone on a bench" (Mother reads the text printed on the page).

Coding reliability

All transcripts were coded by a group of graduate research assistants who majored in child development. Twenty percent of the transcripts were randomly selected and independently coded by another coder. Cohen's Kappa statistic was used to calculate inter-rater reliability for all codes of verbal interactions. The inter-rater reliability of verbal interactions was .96, .90, and .95 at Time 1, Time 2, and Time 3, respectively.

Data analysis

Videotaped mother-child interactions during the reading of the book, *Smiling*, across the three time-points were transcribed using the standard CHAT format of the Child Language Data Exchange System (CHILDES) and later analyzed by the CLAN programs of the CHILDES system (MacWhinney, 2000). Statistical analyses such as ANOVA, Pearson-Product correlation, and multiple regression were performed using the SPSS program.

Results

Taiwanese mothers' and children's verbal output during joint book-reading across time

Using the CLAN programs, this study calculated the total number of utterances, the mean length of utterances (MLU), the mean length of turns (MLT), the total number of different words, and the total number of words in mothers' and children's talk. For details of the results of these basic language measures, see Chang *et al.* (2016).

Large variation in the total number of clauses produced by the Taiwanese mothers was observed. Hence, we used a percentage of each interaction strategy out of the total number of clauses produced by the Taiwanese mothers for subsequent analyses.

Interaction strategies used by Taiwanese mothers across time

Significant differences were found in maternal use of print-related talk ($F(2,123) = 3.58$, $p < .05$), task-behavioral regulation ($F(2,123) = 21.43$, $p < .001$), response ($F(2,123) = 17.09$, $p < .001$), and text reading ($F(2,123) = 7.66$, $p < .001$) across the three time-points (see Table 1). Taiwanese mothers significantly increased their use of text reading from Time 1 to Time 3 and from Time 2 to Time 3; they also significantly increased the use of print-related talk from Time 1 to Time 3. Maternal use of non-immediate talk and response peaked when the children were at 26 months

Table 1. Interaction strategies used by Taiwanese mothers across time-points

Maternal interaction strategy	Time	Mean	SD	F value (post-hoc test: Tukey HSD)
Description & performance	1	38.73	14.26	1.31
	2	41.43	13.12	
	3	36.42	15.19	
Non-immediate talk	1	3.12	3.39	2.96 (Time 2 > Time 1*)
	2	5.20	4.27	
	3	3.89	4.15	
Print-related talk	1	1.75	1.65	3.58* (Time 3 > Time 1*)
	2	2.34	2.75	
	3	3.42	3.85	
Task & behavioral regulation	1	20.07	9.44	21.43*** (Time 1 > Time 2*** Time 1 > Time 3*** Time 2 > Time 3*)
	2	13.58	7.76	
	3	8.71	6.45	
Response	1	2.65	2.72	17.09*** (Time 2 > Time 1*** Time 3 > Time 1***)
	2	8.70	6.08	
	3	7.46	5.56	
Text reading	1	9.84	12.00	7.66*** (Time 3 > Time 1*** Time 3 > Time 2*)
	2	15.32	19.54	
	3	25.21	21.75	

Notes. * $p < .05$; *** $p < .001$; Time 1: 14 months; Time 2: 26 months; Time 3: 36 months.

(Time 2), but there were no statistical differences in these two codes at Time 2 and Time 3. The mothers significantly decreased their use of the task-behavioral regulation strategy as their children grew.

Correlations between mothers' interaction strategies and children's language and early literacy skills

Pearson correlation analyses were conducted to examine the synchronic and diachronic relationships between the interaction strategies used by Taiwanese mothers across time and the language and early literacy skills of Taiwanese children measured at 36 months (Time 3). With regard to the synchronic relationship at Time 3, significant correlations were observed between maternal print-related talk and (1) children's CDIIT-comprehension subtest ($r = 0.37$, $p < .05$), (2) children's CDIIT-language total ($r = 0.31$, $p < .05$), (3) children's print concepts scores ($r = 0.32$, $p < .05$), and (4) children's story comprehension scores ($r = 0.33$, $p < .05$).

As for diachronic relationships, significant negative relationships were found between (1) maternal task-behavioral regulation at Time 1 and children's performance in the PPVT-R test ($r = -0.39$, $p < .05$) and (2) maternal text reading strategy at Time 1 and children's CDIIT-expression scores ($r = -0.34$, $p < .05$).

Positive diachronic correlations were observed between (1) maternal description and performance at Time 1 and children's PPVT-R scores ($r = 0.44, p < .01$), (2) maternal description and performance at Time 1 and children's CDIIT-language total scores ($r = 0.31, p < .05$), (3) maternal description and performance at Time 1 and children's story comprehension scores ($r = 0.37, p < .05$), and (4) maternal print-related talk at Time 2 and children's print concepts scores ($r = 0.37, p < .05$).

Unexpectedly, no significant correlation was observed between maternal non-immediate talk and any of the children's language and early literacy measures. Since non-immediate talk is a composite code of three sub-categories, i.e., expansion, evaluation, and prediction & inference, the relationships between the three sub-categories and children's language and early literacy measures were examined with the purpose of understanding if any of the three sub-categories might be related to children's language and early literacy performance. One significant diachronic correlation was observed between the maternal prediction and inference at Time 2 and the print concepts scores children received at Time 3 ($r = 0.36, p < .05$); the relationship between maternal evaluation at Time 3 and children's PPVT-R scores was found to be nearly as significant ($r = 0.26, p < .01$).

Predictions of language and early literacy skills of Taiwanese children

In order to explore the combination of interaction strategies used by mothers across time and its predictive power on the language and early literacy skills of Taiwanese children, multiple regression analyses using the stepwise method were performed (see Table 2). Results show that the PPVT-R scores of Taiwanese children received at Time 3 were significantly predicted by maternal use of task behavioral regulation and performance strategies at Time 1. These two strategies explained 24.3% of the variance in children's PPVT-R scores. Children's performance for the CDIIT-comprehension subtest was significantly predicted by maternal use of print-related talk Time 3, and it explained 10.7% of the variance in children's CDIIT-comprehension subtest scores. Children's performance for the CDIIT-expression subtest was significantly predicted by maternal text-reading strategy at Time 1, explaining 11.8% of the variance in children's CDIIT-expression subtest scores. The total scores children received for the CDIIT Language Test were significantly predicted by maternal description and performance at Time 1, which explained 9.9% of the variance in CDIIT-language total. As for early literacy skills, children's print concepts scores were significantly predicted by maternal use of print-related talk at Time 2 and non-immediate talk: prediction and inference at Time 2, which explained 23.1% variance of print concepts scores in total. Story comprehension scores were significantly predicted by maternal use of description and performance at Time 1 and print related talk at Time 3, which explained 20.5% of the variance in Taiwanese children's performance for the story comprehension test.

Discussion

Maternal use of interaction strategies during joint book-reading across time

Congruent with past research on American parents (Goodsitt, Raitan, & Perlmutter, 1988), Taiwanese mothers also significantly increased their direct reading of the text as their children became older. Unlike what was found in previous research

Table 2. Multiple regression analyses of children's language and early literacy measures

Children's language and early literacy measure	Maternal interaction strategy	B	SE of B	β	R ²
PPVT-R	Time 1 Task & behavioral regulation	-0.24	0.15	-0.24	.243
	Time 1 Description & performance	0.22	0.10	0.34*	
CDIIT-Comprehension	Time 3 Print-related talk	0.26	0.12	0.33*	.107
CDIIT-Expression	Time 1 Text reading	-0.04	0.02	-0.34*	.118
CDIIT-Total	Time 1 Description & performance	0.09	0.04	0.31*	.099
Print concepts	Time 2 Print-related talk	0.20	0.09	0.32*	.231
	Time 2 Non-immediate: prediction & inference	0.42	0.19	0.31*	
Story comprehension	Time 1 Description & performance	0.08	0.04	0.32*	.205
	Time 3 Print-related talk	0.24	0.13	0.27†	

Notes. † $p < .10$; * $p < .05$.

(Goodsitt *et al.*, 1988), however, Taiwanese mothers did not significantly decrease their use of the description and performance strategy (such as talk about events, locations, attributes of objects/characters in the book, labeling, onomatopoeia, performing actions/events in the book) as their children grew. A number of previous studies (Row, 2013; Sénéchal *et al.*, 1995; Snow *et al.*, 2001) found that parents in Western societies used more attention-getting strategies when their children were younger, but increased the amount of decontextualized talk as their children grew older. Similar to what the past research found, Taiwanese mothers decreased their use of the task-behavioral regulation strategy but increased productions of non-immediate talk, print-related talk, responses, and text reading over time. These findings suggest that parents across different cultures are sensitive to the language skills their children possess and are capable of adapting their interaction strategies while reading books with their children.

Relationships between maternal interaction strategies and their children's language and early literacy skills

Maternal use of the task-behavioral regulation strategy when the children were 14 months old had significantly negative correlation with the scores children received for the PPVT-R test when they were 36 months old. The task-behavioral regulation strategy was generally used by mothers when children misbehaved, did not pay attention, or when mothers and children negotiated task responsibility. If mothers spent too much time regulating children's behavior, requesting children's attention, or negotiating task responsibilities during joint book-reading, less time would be spent on the actual book-reading task. However, it should be noted that children as young as 14 months old do need more attention and regulation from their mothers

during joint book-reading, particularly for the children who possess low language abilities. These children might easily lose attention during the book-reading activity, owing to their poor comprehension and communication skills, and therefore need more requests for attention and behavioral regulation from their mothers. Task-behavioral regulation, in this sense, may not be regarded as a strategy that benefits or limits a child's language skill. Moreover, it is worth noting that previous research found that Chinese mothers tend to talk more about moral values and proper conduct when they read books to their children compared to American mothers (Chang & Huang, 2016; Luo *et al.*, 2012). These previous studies, however, focus on children older than three-year-olds. It would be important to explore if task-behavioral regulation talk also appears during the book-reading activity by non-Chinese mothers to their infants or toddlers to see if task-behavioral talk is common in mothers of young children across cultural backgrounds.

At 14 months of age, children possess a very limited amount of vocabulary, and their language abilities are low. The present study found a significant negative correlation between maternal text reading strategy at Time 1 and children's CDIIT-expression scores measured at Time 3. As children grew older, Taiwanese mothers increased the use of direct text reading, and the negative correlation between maternal text reading and children's CDIIT-expression scores disappeared. This finding suggests that excessive use of direct reading of text when children are very young might not be beneficial for their language development. Instead, this strategy might be more suitable to be used with older children who have better developed language skills.

Previous studies found that the use of non-immediate talk and print-related talk during joint book-reading helps the language and literacy development of children (De Temple, 2001; De Temple & Beals, 1991; Hindman *et al.*, 2008; Piasta *et al.*, 2010; Rowe, 2013; Snow *et al.*, 2001). Consistent with past research, the present study found that the use of prediction, inference, and evaluation (sub-categories of non-immediate talk) and print-related talk by Taiwanese mothers had positive correlations with children's language and early literacy skills at 36 months of age. Maternal use of prediction and inference strategies is a significant predictor of children's performance in print concept tests. Print-related talk produced by mothers predicts children's language performance, story comprehension, and print concepts scores. The present study extends the scope of previous investigations of print-related talk in Taiwanese families (Chang *et al.*, 2016) and found that maternal use of print-related talk is related not only to children's print concepts scores but also to their language and story comprehension performance, which is similar to what has been observed in Western families (Piasta *et al.*, 2010).

Maternal use of description and performance strategy when the children were 14 months old had significantly positive correlations with their children's scores for the PPVT-R, CDIIT-language total, and story comprehension tests measured at 36 months of age. This strategy is also a significant predictor of children's PPVT-R, CDIIT-language total, and story comprehension scores. These findings show that talk about events, locations, and attributes of objects/characters in the book, labeling, use of onomatopoeia, and performing actions/events in the book during parent-child book reading when children are young, might be helpful for promoting the child's language and story comprehension skills. Past research conducted in Western families found that frequent use of contextualized talk (such as labeling) by mothers was related to slower language development in two-year-old Finnish children (Silven *et al.*, 2003) and early literacy measures in American children (De Temple, 2001;

Hindman *et al.*, 2008). The different findings between the present study and the previous studies might be related to the ages of the children when mothers use this strategy. Frequent use of the description and performance strategy with 14-month-old toddlers help them become familiar with new, unknown words in the book and thus might promote their vocabulary and language skills later. The same strategy used with older children might not be as helpful in facilitating their subsequent language development because they have more advanced verbal abilities. What they need are more challenging tasks, such as predicting what will happen next, explaining why something happened, etc. Choosing appropriate interaction strategies to use during joint book-reading with children at different stages of language and literacy development is an important skill for parents to learn.

Limitations and suggestions for future research

Some limitations have to be considered when interpreting the results of this study. First, the current study observed only 42 Taiwanese families for three years. It would be important to continue following this group of families up into the preschool and kindergarten years, or even up into elementary school years, to investigate the longitudinal influences of joint book-reading on language and literacy development in Mandarin-speaking children. Second, the participants of this study all came from middle- or upper-middle-class families living in the Taipei area. Generalization of the results obtained from this study to all families in Taiwan is not recommended. A larger sample of families, including those from lower socioeconomic status, should be used for future research. Third, the story of the book used in this study is simple and not challenging enough to elicit discussions about the book when the children get older. For future research with three-year-olds or older, a more complex, challenging book is recommended. Fourth, this is not an experimental study and the results cannot be regarded as causal relationships between maternal use of interaction strategies during joint book-reading and children's language and early literacy skills. Studies with experimental designs are called for in order to test such a relationship.

Acknowledgments. This study was supported by Ministry of Science and Technology, Taiwan, ROC [grant number: NSC 97-2628-H-003-001-MY3 & MOST-106-2410-H-003-022-MY3]. The authors are grateful to Yu-sang Wu, Li-feng Yang, Jing-yun Li, Xiang-ru Chen, Qiao-ning Lu, and Yi-ling Lin for their help in data collection and data analyses. Special thanks go to the families who participated in this study.

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