

Shared Book Reading between Mother and Infant Facilitates The Frequency of Joint Attention

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Abstract

This study examines the effect of shared book reading on mother-infant joint attention interactions in infancy. In experiment 1, pairs composed of 9-month-old infants and their mothers ($N = 10$) were observed in three conditions: the shared-book, toy-play, and no-material condition. The results indicate a frequency of passive joint and coordinated joint attention in the shared book context than in others. Experiment 2 longitudinally investigated the effect of increasing the time of shared book reading on the frequency of passive and coordinated joint attention. Twenty-eight pairs of 9-month-old infants and their mothers were randomly assigned to one of two groups; the first was a shared book reading condition ($N = 11$), in which mothers were asked to share books every day and were given picture books regularly from the first observation (at 9 months) until the second observation (at 12 months). In the control group ($N = 11$), mothers were given no instruction. The results show that increasing shared book reading increases the frequency of passive joint attention. Therefore, it is suggested that shared book reading increases joint attention episodes and that repeated shared book reading increases it in other contexts.

Keywords: shared book reading; joint attention; mother-infant interaction; infancy; longitudinal study

Introduction

Shared book reading at home has been advocated as a method of enhancing children's language abilities. In 1992, Bookstart was started by Booktrust in Birmingham, U.K. This program distributes picture books and booklets for shared book reading to infants and their mothers. One of its goals is promoting pre-school child literacy; thus, follow-up surveys on literacy changes in children whose mothers received Bookstart packs were conducted to evaluate the project. For example, the timing of start of the shared book reading was reported as the strongest predictor variable in the literacy of two-year-olds (DeBaryshe, 1993). It was suggested that the earlier mothers and children started sharing picture books, the better the children were at comprehension and speaking (Payne, Whitehurst, & Angell, 1994). Wade & Moore (1998) reported that children whose mothers received Bookstart packs were better at not only reading and writing skills but also mathematics than were children whose mothers had not. Many studies agree that shared book reading promotes children's language skills.

The mechanism of shared book reading's enhancements has not been clear, but one factor is thought to be joint

attention. Tomasello (1995) argues that joint attention is characterized by the coordination of attention among the self, the other, and some external object or event. Shared book reading is thought to be an exceptional opportunity for the occurrence of joint attention (e.g., Karrass, VanDeventer, & Braungard-Rieker, 2003). It is known that joint attention plays an important role in children's language acquisition (e.g., Tomasello & Farrar, 1986). Repeated joint attention between mothers and infants makes mother-infant interactions predictable for infants and renders mapping words on the world easier (Bruner, 1985). As shared book reading provides more episodes of joint attention, it is thought to promote child literacy.

However, whether joint attention episodes occur more often during shared book reading than in other contexts has not been clear. Although many studies have used the shared book context to observe joint attention (e.g., Fletcher, Perez, Hooper, & Claussen, 2005) and have used both picture books and toys at once (e.g., Bakeman & Adamson, 1984; Mundy & Gomes, 1998), few studies have discussed shared book reading separately or compared its joint attention effects with those in other contexts (e.g., toy play).

The few extant studies involve infants older than one year. For example, Yont, Snow, & Vernon-Feagans (2003) compared mothers' utterances to their 12-month-old infants during shared book events with those during toy play and found that the number of utterances about objects made during the mothers' shared attention with their infants was higher in the shared book context than in the toy play one. Another study found that mothers and their 18-month-olds pointed more often in the shared book context than in the wooden block play one (Sugai, Akita, Yokoyama, & Nozawa, 2010). Therefore, shared book reading increased mother-infant joint attention interactions when the infants were older than 12 months.

However, whether shared book reading promotes the number of joint attention episodes in infancy hasn't been confirmed. It is in infancy, especially at around 9 months, that a child's joint attention capacity develops most rapidly (Dunham & Moore, 1995). It is thus necessary that the frequency of joint attention in infancy be compared to shared book reading and other play contexts. Furthermore, an important question is whether continued shared book reading changes the joint attention in mother-infant interaction. If shared book reading facilitated children's

joint attention abilities, joint attention frequency would increase in the other contexts (e.g., a toy-play context) through repeated shared book reading. To investigate this possibility, we need to increase the shared book reading time and examine its effect on joint attention frequency in the other contexts.

Therefore, this study investigates the effect of shared book reading on joint attention frequency by comparing shared book reading and other contexts in experiment 1. Next, we intervene in the shared-book condition group by increasing its shared book reading time; then, we longitudinally compare its joint attention frequency in a toy play situation with that of the control group.

Experiment 1

To investigate whether shared book reading increases joint attention episodes more than other play contexts, we compared the number of joint attention episodes during the shared book reading, toy play, and no material contexts, all common for 9-month-old infants and their mothers. To measure mother-infant joint attention frequency in these free play situations, we used indexes defined by Bakeman & Adamson (1984). Bakeman & Adamson (1984) performed longitudinal observations and indexed descriptions of the joint attention of infants from 6 to 18 months and their mothers in free play situations at home (using picture books and toys) and found that mothers' behavior is important for the occurrence of joint attention in infancy. Bakeman & Adamson (1984) divided joint attention episodes into two components; passive joint and coordinated joint. Passive joint occurs when mothers actively draw the infants' attention to an object, and coordinated joint occurs when infants voluntarily become involved in play and coordinate their attention to both mothers and objects. In passive joint, mothers need actively to lead the infants' attention; once coordinated joint begins, the mother must follow the infant's attention. Bakeman & Adamson (1984) suggest that mothers' coordinated behavior promotes children's joint attention development.

As Yont et al. (2003) and Sugai et al. (2010) show, mothers seem to draw their infants' attention to an object more frequently in the shared book context than in other contexts, and passive joint appears to occur in that context more frequently than in others. On the other hand, coordinated joint behavior may decrease in the shared book context because it does not need mothers' active behavior but rather coordinated and relatively passive behavior.

Method

Participants Ten 9-month-old infants and their mothers participated in this study. The mothers were recruited from an official health center when bringing their children in for checkup.

Procedure Each mother and infant pair individually visited a university laboratory. First, they played freely in a play room for a few minutes and were told that we would videotape their interactions. When they seemed to relax and

play actively, they moved into the next room for the recording sessions.

Conditions All mothers and infants participated in three conditions: (a) in the shared-book condition, the infant and mother were observed while playing on the floor with a set of picture books we provided. We used the word "play" rather than "read" when we instructed them to prevent mothers from feeling they had to read the materials consecutively; (b) in the toy-play condition, the infant and mother played with a set of toys we provided; (c) in the no-material condition, the infant and mother played without using any materials.

Before each session, the mother was instructed to play freely, as if at home. After the instructions, an experimenter moved into a curtained area and sat calmly out of sight of the pair.

Each condition session lasted for about ten minutes and was conducted on different days. The second condition session wasn't conducted until at least three days after the first one, and the third didn't begin until at least three days after the second. The order of the conditions was counterbalanced.

Materials In two conditions, the mother and child used the materials we provided: (a) in each shared-book condition session, a set of picture books was used, consisting of ten books (*Harapeko-Aomushi [The Very Hungry Caterpillar]*, *Jya-Jya Biri-Biri, Kingyo-ga Nigeta, Otsukisama-Konbanha, Kutsu-Kutsu-Aruke, Gatan-Goton Gatan-Goton, Nenai-ko Dareda, Wanwan-Nakunoha-Dare, Kuttuita*), all in Japanese. They were ranked in the top 10, by a bookstore near the university when surveyed on the bestselling picture books for 9-month-olds; (b) in each toy-play condition session, a set of ten toys was used: a ball containing a bell and a small doll, a handkerchief that makes paper sounds, a rattle, a toy telephone, a cloth bar that makes a funny sound, a toy trumpet, a roly-poly, a pacifier, a toy car containing a bell, and a toy tambourine. These had also been ranked in the top 10 by a toy store near the university when surveyed on the bestselling toys for 9-month-olds.

Coding After the above sessions, the videotaped mother-infant interaction was coded for ten minutes by an experimenter sitting out of sight of the pair. Six categories of engagement, as defined by Bakeman & Adamson (1984), were used to code the interactions: (a) unengagement, in which the infant appears uninvolved with the mother, object, or activity, although he or she might be scanning the environment; (b) onlooking, in which the infant is observing the mother's activity, often quite intently, but not taking part in the activity; (c) persons, in which the infant is engaged with just the mother (typically involving face-to-face or individual play, as, for example, when infants giggle and coo when their mothers place their face close to theirs and tickle them); (d) objects, in which the infant is involved in playing with objects alone, attending only to the books, toys, or whatever is at hand; (e) passive joint, in which the infant and mother are actively involved in the same object but the infant evidences little awareness of the mother's

involvement or even presence (mothers often attempt to induce this state by manipulating objects in ways that seem designed to capture their infants' attention and make the objects "come alive" for them); and (f) coordinated joint, in which the infant is actively involved in and coordinates his or her attention to both mother and the object the mother is involved with (as, for example, when the infant pushes a toy car the mother has been pushing and then looks back and forth between the mother's face and the toy car). If the infant gazes the object only by mother's attention drawing behavior and gazes mother's face only by mother's voice but doesn't keep gazing just one of them and doesn't voluntarily shift attention between them, the episode was coded into passive joint. On the other hand, if the infant alternately shift attention between them on his or her own initiative, the episode was coded into coordinated joint.

Fifty percent of the sessions were coded independently by two experimenters. The degree of agreement was gauged using Pearson's product-moment correlation coefficient (r). The r s ranged from .91 to .98.

Results

The average durations of the six engagements (unengagement, onlooking, persons, objects, passive joint, and coordinated joint) during each condition (shared-book, toy-play, and no-material) are presented in Table 1. These durations were analyzed with the conditions using a repeated-measures analysis of variance (ANOVA), run separately for each engagement category. The results of ANOVA indicated significant differences in unengagement, persons, objects, passive joint, and coordinated joint ($F(2,18) = 22.76, p < .01, \eta_p^2 = .72; F(2,18) = 53.07, p < .01, \eta_p^2 = .92; F(2,18) = 20.47, p < .01, \eta_p^2 = .69; F(2,18) = 29.04, p < .01, \eta_p^2 = .76; F(2,18) = 13.02, p < .01, \eta_p^2 = .59$, respectively) and no significant difference in onlooking. Multiple comparison tests (Bonferroni, $p < .05$) were conducted in the former five categories.

In unengagement and persons, the mean duration in the no-material condition was significantly longer than in the shared-book and toy-play conditions. There was no significant difference between the shared-book and toy-play conditions. In objects, the mean duration in the shared-book condition was significantly longer than in the no-material

and that in the toy-play was significantly longer than in the shared-book. In passive joint and coordinated joint, the mean duration in the toy-play condition was significantly longer than in the no-material, and that in the shared-book was significantly longer than in the toy-play.

Discussion

Passive joint occurred more often in the shared book context than in other contexts, as we had predicted. These results indicate that mothers' efforts to draw infants' attention to an object seem stronger in the shared book context than in other contexts. Therefore, not only infants older than 12 months but also younger infants follow the passive joint pattern with their mothers more often in the shared book context.

One reason for this is that shared book reading requires adults. Picture books consistent with the codes (like pictures and letters) require adults to scaffold the children's understanding, as they can't read letters (Karpov, 2005). Therefore, mothers spontaneously increase active drawing attention behavior more in shared book reading context.

On the other hand, coordinated joint also increased more in the shared book reading context than in other contexts. This result shows that although the mothers actively draw their child's attention, once the coordinated joint event begins through the infant in the shared-book reading context, the mother follows the infant's attention, which coordinates their behavior and attention.

One of the reasons for this is the difference in attractiveness between picture books and toys. Many of the toys used in this study were common among 9-month-old infants and made sounds. Nine-month-olds prefer objects that make sounds and toys are more attractive than picture books. The duration results in the object category show that duration was significantly longer in the toy-play than in the shared-book context. It is known that mothers are appeased more readily when their children maintain their focus on an object (Harman, Rothbart, & Posner, 1997). When faced with unattractive objects, infants are put into bad moods, and mothers must then struggle to produce a good mood. Therefore, mothers may become sensitive about their child's attention or intent.

Table 1: The durations of the engagement states in the shared-book, toy-play, and no-material contexts.

State of engagement	Shared-Book Context		Toy-Play Context		No-Material Context	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Unengaged	141.15	63.19	84.30	19.35	292.00	111.80
Onlooking	53.90	53.92	50.30	52.85	13.35	15.61
Persons	30.30	25.72	14.40	10.12	226.90	122.84
Objects	168.85	83.40	341.60	59.38	45.45	47.81
Passive Joint	182.35	83.38	98.75	70.68	18.30	29.77
Coordinated Joint	23.60	22.23	10.95	18.91	4.00	10.36

Note: the numerical values are presented in seconds. $N = 10$.

Experiment 2

In experiment 1, passive joint and coordinated joint increase more in the shared book reading context than in other contexts. As previously indicated, if shared book reading facilitates child literacy by enhancing joint attention ability, increasing the shared book reading time may promote joint attention frequency not only in the shared book reading context but also in the others. To explore this possibility, we investigated the effect of increased shared book reading time on joint attention frequency by creating a shared-book condition group and the control condition group.

A child's joint attention ability develops rapidly at around 9 months of age (Dunham & Moore, 1995). Visual joint attention (Butterworth, 1991), the act of following the direction of another's gaze (like passive joint) develops quickly between 10 and 12 months (Corkum & Moore, 1995). Moreover, active joint attention, drawing someone's attention to an object (like coordinated joint) develops at around 12 months, later than passive joint (Lemper, 1979; Leung & Rheingold, 1981). Therefore, timing our intervention (i.e., increasing the shared book reading) at between 9 and 12 months seems appropriate.

As Bakeman & Adamson (1984) suggest, coordinating the mother's behavior to her infant's is important in producing and developing the child's joint attention ability. Experiment 1 revealed how, in the shared book context, passive and coordinated joint occurred more often than in the other contexts, and the mothers' coordinate behavior occurred more frequently. Therefore, conducting shared book reading seems to facilitate the frequency of both passive and coordinated joint.

Method

Participants Twenty-two 9-month-old infants and their mothers participated in this study. Recruiting occurred as in experiment 1. They were divided into two condition groups of 11 pairs each, based on the infant's age, in the first of two recorded free play sessions (for children of 9 and 12 months). One of the groups (with 6 boys and 5 girls) was the shared-book condition. The other (with 7 boys and 4 girls) was the control condition.

Conditions (a) In the shared-book condition, after the first recorded free play session for the 9-month-olds, each mother was instructed to share picture books with her infant at least once a day (unless something prevented it) and to visit the laboratory again when the infant was 12 months of age. The experimenter sent each mother two picture books every four weeks when the infant was between 9 and 12 months of age. The mothers received six picture books in total, chosen by her from the eight books we provided after the first recorded free play session. The aim was to motivate the mother to share books with her infant; thus sending books the mothers had already used was avoided. The eight books we provided were suggested by Bookstart Japan (2006): *Jya-Jya Biri-Biri*, *Otsukisama-Konbanha*, *Kingyo-ga Nigeta*, *Kudamono*, *Tamago-no-Akachan*, *Pyo-nn*, *Shirokumachan-no-Hotcake*, *Rhythm*. (b) In the control

condition, the mother was given no instructions beyond being asked to visit the laboratory again when the infant was 12 months.

Procedure Each mother and infant pair visited a university laboratory. First, they played freely in a play room for a few minutes and were told that we would be videotaping their interactions. When they seemed to relax and play actively, they moved into the next room for the recording sessions. After the sessions, the mother was asked to fill out a questionnaire asking her the amount of time she had spent sharing books and toys respectively with her infant in the week prior to coming for the session for both the first and second laboratory visits.

The recorded free play session All mothers and infants participated in the session when the infants were 9 and 12 months. They were observed while they played on the floor with a set of toys we provided. The set of toys comprised a plastic boat, a stuffed monkey, a puzzle, a set of wooden blocks, a set of shape sorting cubes, and a drawing board, as was used by Stipek, Recchia, & McClintic (1992).

Before beginning the session, the mother was instructed to play freely, as at home. After the instructions, the experimenter moved into a curtained area and sat calmly out of sight of the pair. The session lasted for about ten minutes.

Coding After the above sessions, the videotaped mother-infant interaction in the recorded free play session was blindly coded for just ten minutes by the experimenter sitting out of sight of the pair. In experiment 2, two of the six categories (Bakeman & Adamson, 1984), passive joint and coordinated joint, were used to code the mother-infant interactions.

Twenty-five percent of the sessions were coded independently by two experimenters. The degree of agreement was gauged with Pearson's product-moment correlation coefficient (r). The r s of passive joint and coordinated joint were .81 and .87, respectively.

Results

1 Analysis of the time spent on shared book reading and interaction between mother and infant Three data sets were missed because the mothers had no time to fill out the questionnaire after the free play session. The average amount of time spent in shared book reading and interaction between mothers and infants in each group with infants of 9 and 12 months is shown in Table 2. The time of interaction means the total time during which mother shared books or toys with her infant. Data on the mean amount of time were analyzed in a 2 (age: 9 and 12 months of age) \times 2 (group: the shared-book and the control group) mixed analysis of variance (ANOVA), in which age was a within-subject and group a between-subject variable, after a logarithmic transformation. In shared book reading time, the result of ANOVA yielded a significant age \times group interaction ($F(1, 17) = 5.79, p < .05, \eta_p^2 = .25$). The results of subordinate tests indicated a significant simple main effect of age in the shared-book condition group ($F(1, 34) = 5.30, p < .05$), meaning that mothers shared books with their infants more

often when their infants were 12 months of age than when they were 9 months, and a significant simple main effect of group when infants were 12 months of age ($F(1, 17) = 5.02, p < .05$), meaning that mothers in the shared-book condition shared books with their infants when they were 12 months of age more often than in the control condition.

In interaction time, the result of ANOVA revealed no significant difference anywhere.

Table 2: The Amount of Time of Shared Book Reading and Interaction in The Shared-Book and Control Groups.

Group	9 months of age		12 months of age	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Shared-Book (<i>N</i> = 11)				
Shared book reading	60.32	100.02	97.82	73.77
Interaction	1312.14	1005.88	1141.00	769.66
Control (<i>N</i> = 8)				
Shared book reading	60.63	68.94	35.00	35.04
Interaction	1976.88	1013.97	1302.50	501.02

Note. There numerical values are presented in minutes per a week

2 Analysis of the number of times of joint attention episode The average number of times of passive joint and coordinated joint in each group when infants were 9 and 12 months of age are presented in Figure 1 and Figure 2, respectively. The mean numbers of times data were analyzed in a 2 (age: 9 and 12 months of age) \times 2 (group: the shared-book and the control group) mixed analysis of variance (ANOVA) where age was within-subject and group was between-subject variables.

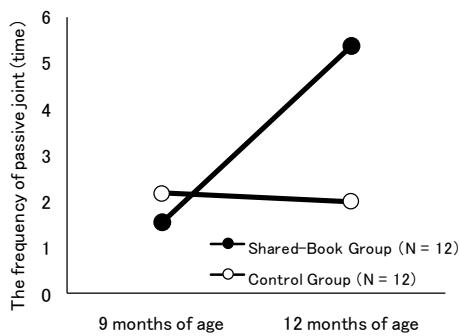


Figure 1 The Frequency of Passive Joint in Both Groups.

In passive joint, the results of ANOVA indicated a significant age \times group interaction ($F(1, 20) = 4.59, p < .05, \eta_p^2 = .19$). The results of the subordinate tests indicated a significant simple main effect of age in the shared-book condition group ($F(1, 20) = 8.37, p < .01$), meaning that, in that group, the frequency of passive joint was higher when

the infants were 12 months than when they were 9 months, and a significant simple main effect of group when infants were 12 months ($F(1, 40) = 5.67, p < .05$), meaning that the frequency in the shared-book condition was higher than in the control condition when infants were 12 months. The results of ANOVA also yielded a significant main effect of age ($F(1, 20) = 3.80, p < .10, \eta_p^2 = .16$), meaning that the frequency of passive joint significantly increased from when infants were 9 months to when they were 12 months.

In coordinated joint, the results of ANOVA indicated a significant main effect of age ($F(1, 20) = 13.56, p < .01, \eta_p^2 = .40$), meaning that the coordinated joint frequency significantly increased from when infants were 9 months to when they were 12 months.

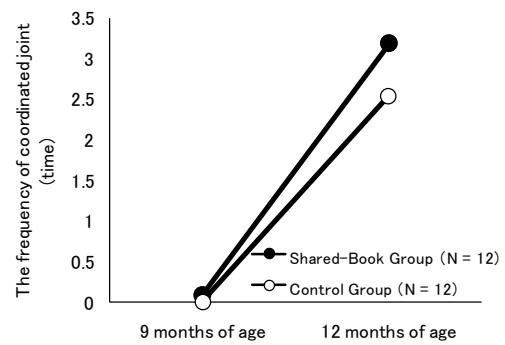


Figure 2 The Frequency of Coordinated Joint in Both Groups.

Discussion

The results in Table 2 show that, in the shared-book group, the amount of time spent in shared book reading significantly increased and that this time was greater for the 12-month-olds in the shared-book group than in the control group. The results in Table 2 also show that the amount of time of whole interaction was no different between groups. Therefore, our intervention through increasing the shared book reading time seems to have been successful, but it doesn't mean just increased interaction time.

As Figure 1 indicates, passive joint frequency significantly increased in the shared-book group for the 12-month-olds, and the shared-book group's frequency was higher than the control group's. Therefore, it was suggested that increasing the shared-book reading time increases the passive joint dimension.

One reason for this is that the child's joint attention ability was promoted by the shared book reading. The occurrence of passive joint allows the child to find and follow his or her mother's gaze. As indicated in Experiment 1, passive joint occurred more often in the shared book context than in other contexts. The children in shared book reading group had more opportunities to have passive joint experience and to be aware of the existence of his or her mother's gaze or attention than those in control group, which is foundation of the ability of joint attention. A child's ability to follow the direction of people's gazes (as in passive) develops

rapidly from 10 to 12 months (Corkum & Moore, 1995). The children in shared book reading group were promoted to be aware the existence of others' attention through their shared book reading activities at home, and it promoted the development of passive joint and the success of passive joint was higher at 12 months old.

The results in Figure 2 show that the pairs in both groups increased in coordinated joint but that there was no difference between groups. The reason involves the maturation factor in a child's coordinated joint attention ability. As mentioned, passive joint attention ability develops remarkably between 10 and 12 months (Corkum & Moore, 1995), but coordinated joint attention ability develops at around 12 months (Lempers, 1979; Leung & Rheingold, 1981). Therefore, infants in both groups developed their abilities dramatically before reaching 12 months, and the study masked the effect of shared book reading on coordinated joint. In future, we must measure coordinated joint at younger and older ages than 12 months to eliminate the influence of the maturation factor.

Conclusion

The results of experiment 1 show that, in the shared book context, passive and coordinated joint occurred more often than in the other contexts. This indicates that, in that context, mothers actively draw their child's attention to objects but coordinately follow their child's gaze and behavior. The results of experiment 2 suggest that repeated shared book reading increased the frequency of passive joint attention not in the shared book context but in the other context. This indicates that the shared book reading experiment facilitated the child's joint attention ability and/or promoted the mother's skill at drawing the child's attention.

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