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RESPONSIVENESS IN JAPANESE MOTHERS: CONSEQUENCES AND CHARACTERISTICS

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Certain psychological characteristics arise early in life, and the nature of mother-child interaction has been hypothesized to be at least one important source of individual differences in development. In this report, we examine the role of maternal responsiveness as one central interactive experience of early life. We conducted two observational studies of responsiveness in Japanese mothers interacting with their young infants in the natural setting of the home. Here we discuss the characteristics of maternal responsiveness, and relations between maternal responsiveness and other maternal and infant activities as well as expressions of children's cognitive competencies. The results speak to the role of maternal responsiveness in mother-infant interaction in Japan, as well as to the potential general significance of maternal responsiveness in child development.

These studies are concerned with characteristics of responsiveness in Japanese mothers and some consequences of maternal responsiveness in child development in Japan. Two specific considerations motivated our research. First, strong and fixed opinions about Japanese childcare practices are widely held. For example, Japanese mothers enjoy considerable reputation for extreme closeness to their infants. And, it is believed that traditional Japanese mothers organize interactions with their infants so as to foster interdependence and consolidate and strengthen the mother-infant bond (e. g., Befu, 1986; Caudill, 1973; Chen & Miyake, 1983; Doi, 1973; Hess, Azuma, Kashiwagi, Dickson, Nagano, Holloway, Miyake, Price, Hatano, & McDevitt, 1986; Kojima,

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1986a, b; Morsbach, 1980). Yet, there exists a dearth of observational information about day-to-day childrearing practices among modern Japanese (see Bornstein, 1989a; Bornstein, Azuma, Tamis-LeMonda, & Ogino, 1990; Bornstein, Miyake, & Tamis-LeMonda, 1987; Bornstein, Toda, Azuma, Tamis-LeMonda, & Ogino, 1990; Caudill & Weinstein, 1969; Miyake, Campos, Kagan, & Bradshaw, 1986; Otaki, Durrett, Richards, Nyquist, & Pennebaker, 1986; Sengoku, Davitz, & Davitz, 1982; Shand & Kosawa, 1985a, b). As a consequence, efforts toward obtaining additional data on mother (and infant) activities and interactions have been called for (Azuma, 1986; Bornstein, 1989b; Chen & Miyake, 1983).

Studies of Japanese mothers in interaction with their preschool-age children are also particularly timely on account of recent findings about familial antecedents of early cognitive development. Cross-national studies show that Japanese youngsters, even by the time they enter first grade, consistently outperform children from many other lands in terms of academic achievement (e.g., Hess et al., 1986; Stevenson, Lee, & Stigler, 1986a, b; Stevenson, Stigler, Lee, Lucker, & Kitamura, 1985). IQ per se is not apparently the significant factor in this advantage (see Stevenson & Azuma, 1983). The fact that such differences in achievement obtain among preschoolers suggests that forces both in the family and in very early childrearing may be influential. Previously, we reported that Japanese mothers encouragement of infant attention can have long-term (beneficial) influence on cognitive performance in their children (Bornstein et al., 1987). To continue our investigation of such factors, we focus in this report on a second kind of maternal behavior demonstrated to possess predictive validity for cognitive development, viz. maternal responsiveness (see Bornstein, 1989b).

Maternal responsiveness encompasses those prompt, contingent, and appropriate reactions mothers often give to their infants behaviors. Maternal responsiveness to infants has frequently been reported to predict cognitive and language achievement in children. Responsiveness has attracted developmental researchers because of this potential, and because it reflects faithfully an important event sequence in everyday exchanges between child and mother. The appeal of maternal responsiveness, together with provocative predictive findings extant in the literature, motivated us to take a closer look at the characteristics and consequences of maternal responsiveness for children's cognitive development in Japan. They may help further to explicate the nature of mother-infant interaction in Japan and the academic performance of Japanese children.

In this examination of maternal responsiveness, we analyzed two data sets. In the first, we conducted observations of mothers from Sapporo, Hokkaido interacting at home with their young infants, and we assessed relations of maternal responsiveness in infancy to mother and infant activities and to two indexes of children's later cognitive development. In the second, we examined specific kinds of responsiveness microanalytically in Tokyo mothers. Our studies focused on maternal responsiveness in middle infancy because at this time babies exhibit an appreciation of the environment outside the dyad, and also take an active role in turn-taking exchanges (Bornstein & Tamis LeMonda, 1989; Cohn & Tronick, 1987; Emde, Gaensbauer, & Harmon, 1976; Kaye & Fogel, 1980; Wolff, 1984).

THE SAPPORO LONGITUDINAL DATA SET

This study was intended principally to assess the predictive validity maternal responsiveness possesses for children's cognitive growth. Specifically, in a longitudinal analysis, we examined relations between responsiveness in Japanese mothers to their 4- to 5-month-olds and two indexes of children's cognitive competencies in the second and third years of life. We also studied relations of maternal responsiveness to other significant mother and infant activities.

METHOD

Sample

Thirty-one mothers from Sapporo, Hokkaido and their infants participated. Babies averaged 145 days of age at the time of home observations and 17 and 32 months, respectively, at the times of the two follow-up child tests. All infants were term at birth and healthy during the course of the study, and the sample was balanced for sex. Mothers and babies came from broadly middle socioeconomic status households; mothers were in their 20s and 30s and had high school, commusity school, junior college, or university educations.

Home Observation

Procedure. Procedures for home observations and data coding followed those used previously in our research (e. g., Bornstein, 1985; Bornstein & Tamis-LeMonda, 1989). Mothers were asked to behave in their usual manner and to disregard the observer's presence insofar as possible. Beside the observer, only mother and baby were normally present in the home. Observations took place at times of the day that were optimal in terms of individual babies being in awake and alert states; infants were judged to be predominantly in states of quiet or active alert (modified from Brazelton, 1973) during all home visits. The goal was to observe mothers and infants under the most natural and unobtrusive conditions possible, and not to standardize the context of data collection beyond what naturally occurred in the home. The observation period lasted a minimum of 45 minutes, which for scoring purposes was divided into alternating 30-second observing and recording periods (Seitz, 1988). The duration of each period was signalled to the observer by an automatic timer.

At the initiation of each observation period, the observer recorded the infant's state and whether the infant was in view of the mother. Six maternal activities and five infant activities were coded (complete operational definitions are available from the first author). Two maternal activities coded responsiveness to infant nondistress and distress, respectively. Mothers were credited with responding contingently to infant nondistress if, within a 30-second period, they behaved in a way which was contingent on infants nondistress vocalization or nondistress behavior (looking, touching, etc.). For example, if an infant looked at an object, and his or her mother then moved the object towards the infant so that the infant could reach it or she named or described the object, she was credited with responsiveness. Mothers were credited with responding contingently to infant distress if, within a 30-second period, they behaved in a way which was contingent on the infants distress signals (Brazelton category 6). In

both cases mothers actions had to be infant dependent, in other words their actions had somehow to match the infants actions; contiguity alone did not count.

For comparison and control purposes, two other maternal activities were coded: mothers extradyadic (environment-oriented) and dyadic (mother-oriented) stimulation of infant attention. Finally, two codes assessed maternal speech to the infant, either as in the infant register associated with "motherese" or as taking adult conversational tones. Five infant activities consisted of visual attention, coded as extradyadic (environment-oriented) and dyadic (mother-oriented), of tactual exploration, and of nondistress and distress vocalization.

A native Japanese (who was fluent in English) coded mother and infant behaviors. He and an experienced American observer also coded several comparable American visits. Agreement for the 11 categories of mother and infant activity averaged 82% and for state 97%.

Data reduction. Maternal responsiveness to infant nondistress was scored as the frequency of intervals in which mothers responded to infant nondistress activities. Maternal responsiveness to infant distress was scored as a proportion relative to the number of times infants signalled distress. In addition, we z-transformed each maternal responsiveness score and added the two to give mothers a value for total maternal responsiveness. Frequency counts were obtained for the number of intervals in which each of the other mother and other infant activities occurred.

Child Testing

At 1½ years of age, children were tested in a laboratory setting with Koga's Japanese translation and standardization of the Cattell Infant Test (MCC Baby Test). At 2½ years of age, they were tested with Tanimoto, Nagano and Tajima's Japanese translation and standardization of the Peabody Picture Vocabulary Test (PPVT).

RESULTS AND DISCUSSION

The results of this study of maternal responsiveness are organized as follows. First, descriptions of basic mother and infant activities and child performance are reported. Second, concurrent correlations between maternal responsiveness and other significant mother and infant activities are reported. Third, predictive relations between maternal responsiveness and the two indexes of childhood cognitive performance are reported.

Descriptive Data on Maternal Responsiveness and Other Mother, Infant, and Child Activities

Table 1, Section A shows that Japanese mothers exhibited responsiveness to their infants nondistress signals (looking, touching, nondistress vocalizing) in approximately 25% of the intervals of the observation period. Table 1, Section B shows that infants themselves exhibited each of these activities in about 25% of the intervals of the observation period; overall, however, infants exhibited one or another of these activities in nearly 80% of the intervals of the observation. Japanese mothers exhibited responsiveness to almost 80% of infants distress vocalizations, however Japanese infants exhibited

TABLE 1

Descriptive Statistics for Basic Activities of Japanese Mothers and Infants[a]

	M	(Range)
A. *Mother activities*		
Responsiveness		
Nondistress activity	22%	(0- 51%)
Distress vocalization[b]	77%	(0-100%)
Stimulation		
Extradyadic	19%	(2- 56%)
Dyadic	13%	(0- 31%)
Speech		
Infant register	9%	(0- 31%)
Conversational tones	54%	(9- 87%)
B. *Infant activities*		
Attention		
Extradyadic	31%	(7- 60%)
Dyadic	18%	(0- 44%)
Tactual exploration	32%	(4- 73%)
Vocalization		
Nondistress	32%	(2- 82%)
Distress	12%	(1- 47%)
C. *Child performance*		
MCC Baby Test	120.8	(96-142)
PPVT	22.6	(13- 39)

[a] Noncontingent data from Bornstein *et al.* (1987).

[b] A ratio: Maternal responsiveness to infant distress divided by infant vocalize distress.

distress during about only 10% of the observation period. Japanese mothers vary widely in responsiveness of both kinds. Some mothers never responded to their infants nondistress signals, whereas other mothers responded in more than 50% of the intervals. Likewise, some mothers never responded to their infants distress signals, whereas other mothers always responded. As can be seen in Table 1, mothers and their infants showed notable individual differences in other activities as well.

Importantly, maternal responsiveness to infant nondistress signals and maternal responsiveness to infant distress signals did not covary, $r = .11$. This implies that the two kinds of responsiveness are different, and as a consequence suggests that they should be considered separately.

Concurrent Correlations between Maternal Responsiveness and Other Mother and Infant Activities

In mothers. Basic correlations between responsiveness in Japanese mothers and other maternal activities appear in Table 2. With two exceptions in this data set responsiveness did not covary with other maternal activities. Mothers who responded to infant nondistress more also spoke to their infants more in adult conversational tones. Mothers who responded to infant distress more also stimulated their infants in dyadic

TABLE 2
Concurrent Correlations of Maternal Responsiveness with other Mother Activities

	Stimulation		Speech	
	Extradyadic	Dyadic	Infant register	Conversational tones
Responsiveness				
Nondistress activity	.06	.18	.25	.70***
Distress vocalization	.11	.33*	.00	.14

*$p \leq .05$ ***$p \leq .001$

TABLE 3
Concurrent Correlations of Maternal Responsiveness with Infant Activities

	Attention		Tactual	Vocalization	
	Extradyadic	Dyadic	exploration	Nondistress	Distress
Responsiveness					
Nondistress activity	−.13	.30*	.25	.45**	.02
Distress vocalization	.05	.35*	.28	.29	1.00

*$p \leq .05$ **$p \leq .01$

Between mothers and infants. Table 3 shows patterns of correlation between responsiveness in Japanese mothers and activities in their babies. Mothers who were more responsive to their infants nondistress had infants who looked at their mothers more and who vocalized nondistress more. Mothers who were more responsive to their infants distress also had infants who looked at them more. There is, thus, a noteworthy specificity of correspondence among these particular mother and infant activities. It should be remembered, however, that these relations between maternal responsiveness and infant activities at home were evaluated in the context of mother-infant interactions; thus, these current relations might reflect, at least in part, interdependencies in the data.

Predictive Relations between Maternal Responsiveness and Children's Cognitive Performance

Finally, the predictive validity of maternal responsiveness measured at 5 months for selected aspects of children's later cognitive development was assessed. In specific, 27 of the original 31 infants were tested on the MCC Baby Test when they reached 1½ years of age and 26 infants on the PPVT when they reached 2½ years of age. Table 4 shows resulting predictive relations. Japanese mothers who were more responsive to their infants had toddlers who scored higher on the MCC Baby Test and young children who obtained higher PPVT scores. Because early encouragement of infant attention also predicted children's performance in this sample (Bornstein *et al.*, 1987), we partialled mothers encouragement of infant attention from these longitudinal associations in order to assess the predictive validity of maternal responsiveness per se. Even under these constraints, as Table 4 shows, maternal responsiveness predicted children's cognitive performance, signifying the unique importance of contingency in infancy to later mental development. These data are comparable to predictive data for U. S. sam-

TABLE 4

Predictive Correlations between Maternal Responsiveness in Infancy and MCC Baby Test and Child PPVT Performance

Maternal responsiveness at 5 Months	MCC Baby Test at 17 Months	Child PPVT at 32 Months
Nondistress activity[a]	.48**	.14
Distress vocalization	.32	.37*
Total[a]	.58**	.43*

*$p \leq .05$ **$p \leq .01$

[a] Controls for maternal didactic stimulation.

ples (see Bornstein & Tams-LeMonda, 1989).

THE TOKYO MICROANALYTIC DATA SET

Given the potential significance of maternal responsiveness to children's cognitive development, we endeavored to study the responsiveness process more closely in a second data set. We therefore conducted a microanalysis of maternal responsiveness in Japanese mothers, focussing on responsiveness in mother-centered interactions and in environment-centered interactions. To accomplish this goal, sequences of mother and infant activities over minutes-long segments were identified and closely analyzed from approximately hour-long observations of naturalistic mother-infant interactions in the home.

METHOD

Sample

Twenty-four mothers from Tokyo and their infants participated. Babies averaged 163 days of age at the time of home observations. All infants were term at birth and healthy during the course of the study, and the sample was balanced for sex. Mothers and babies came from broadly middle socioeconomic status households, and mothers were in their 20s and 30s and had high school, community school, junior college, or university educations.

Home Observation

Procedure. The home observation procedures were the same as those described above.

Data reduction. From a 45-minute videotaped observation of mother-infant interaction, two separate 3-minute segments were identified: the first instance in which a mother focussed her infant's attention on a property, object, or event in the environment and the first instance in which a mother focussed her infant's attention on the mother herself. The target events were identified by a trained observer different from the observer who scored the data for the present analysis (see Bornstein et al., 1990).

Identification of each target behavior was then checked by the coder who conducted the present analysis. Three minutes is a common duration for study in microanalysis of mother-infant interaction (see Cohn & Tronick, 1987; Fogel et al., 1988; Stern, 1985).

Infants visual orientation to the environment and to mother, and maternal responsiveness by contingently physically encouraging infant attention during these epochs of mothers extradyadic (environment-oriented) and dyadic (mother-oriented) interactions were exhaustively coded by a trained native Japanese who was fluent in English. This coder recorded each behavior category and time of onset from a digital clock on the video screen. Two steps were taken to establish coding reliability. First, to learn the categories, the Japanese coder and a highly experienced American coder independently scored 12% of the 45-minute sessions; their agreement averaged $r=.99$. Second, the Japanese coder scored durations of all activities in 10% of the 3-minute segments twice, and achieved a high test-retest timesequence reliability, average *kappa*=.82 (Cohen, 1960; Gelfand & Hartmann, 1975). One Japanese mother did not stimulate her infant dyadically, and another failed to stimulate extradyadically in the 45-minute session; these two mothers could not be assessed in the microanalysis.

RESULTS AND DISCUSSION

In the environment-oriented interactions infants looked at properties, objects, or events an average of 4.6 times, and in the mother-oriented interactions infants looked at mother an average of 2.5 times, a significant difference, $t=2.57$, $p=.01$. Infants also looked longer on average at properties, objects, or events in the environment than at mother, $Ms=13.0$ and 3.3 seconds, $t=2.05$, $p=.05$. As a consequence, rates of maternal responsiveness were analyzed taking into consideration base rates of infant activities (proportions were arc sine transformed prior to statistical analysis). Despite these differences in infant base rates favoring an exvironmental orientation, Japanese mothers responded proportionally more often to mother-oriented (.36) than to environment-oriented (.10) bids on the part of their infants, $t=2.78$, $p<.01$. When mothers responded, there was, however, no difference in their latency to respond in the two kinds of interactions, 2.5 seconds in environment-oriented ones and 2.8 seconds in mother-oriented ones.

SUMMARY AND CONCLUSIONS

Naturalistic observations of maternal responsiveness in the home setting were conducted in Sapporo and in Tokyo. This study was motivated by several separate but related rationales. One concerned the need for basic data on selected maternal behaviors. A second concerned basic cross-cultural comparison on the universal roles that selected maternal childrearing practices may play in children's cognitive growth. For the first, we analyzed Cohort II data from Miyake's ongoing longitudinal study of mothers and babies in Sapporo. For the second, we analyzed data from a cohort of mothers and babies in Tokyo.

We found high levels of responsiveness among Japanese mothers, and also a relative independence of different forms of responsiveness, and of responsiveness in relation to other significant forms of maternal activity. Psychoanalysts and ethologists have

frequently hypothesized that maternal behavior is a more or a less unitary construct —called 'good,' 'sensitive,' or 'warm'—despite the dynamic range of activities mothers naturally engage in (e. g., Ainsworth, Blehar, Waters, & Wall, 1978; Brody & Axelrad, 1978; Rohner, 1985). Analysis of covariation among maternal activities tests the validity of this conceptualization. Our results fail to support the hypothesis, but instead support a view of maternal behavior as differentiated and individualized.

We also found that responsiveness on the part of Japanese mothers to their infants predicts children's later cognitive performance, even when maternal noncontingent stimulation is statistically removed from consideration. Past research in the United States has established a long-term predictive value of maternal interaction style in infancy for select cognitive competencies in childhood. Thus, an interactive mechanism of development, maternal responsiveness, appears to function analogously in considerably different cultures.

Finally, we found that responsiveness in Japanese mothers varies with the context of their interactions, and that, true to repute, Japanese mothers tend to reward their infants bids to them relative to their infants bids to properties, objects, or events in the environment.

Responsiveness in Japanese mothers has been studied microanalytically at least three times previously. Observing 36 Japanese and American mothers and their 3 -month-olds in a face-to-face interaction, Fogel, Toda, and Kawai (1988) found that Japanese mothers used a greater amount of nonverbal visual stimulation and touching in response to infant activity than did American mothers. Observing speech patterns of 20 Japanese and American mothers to their 3-month-olds, Morikawa, Shand, and Kosawa (1988) found that Japanese mothers showed a propensity to imitate vocalizations of their infants in order presumably to control infants subsequent vocalizations. Bornstein et al. (1990) also reported qualitative comparative data on maternal responsiveness in Japan and in the United States. Analysis of maternal responding in terms of the organization of infant attention in this study showed that when Japanese infants looked at their mothers, Japanese mothers tended to encourage them to attend to the environment, and when Japanese infants looked at the environment Japanese mothers tended to encourage them to attend to the mothers themselves. By contrast, when American infants looked at their mothers or at the environment, their mothers reinforced their infants attentional focus. In short, Japanese mothers attempted to change topics of infant focus through responsiveness, whereas American mothers responded to expressed infant interest no matter what the topic. These varying goals of responsiveness appear to suit Japanese and American cultural ends: Americans tend to emphasize exploratory activity and initiative in their children, whereas Japanese want to channel children's activities.

Perhaps, Japanese mothers levels of responsiveness, orientation of responsiveness to self, and engagement of infants to attend when infants are involved in environmental exploration and decreased social attention contribute to the general impression that Japanese mothers are especially close to their infants.

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