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Title	RELATION OF TEMPERAMENTAL DISPOSITION TO CLASSIFICATION OF ATTACHMENT : A PROGRESS REPORT
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Description	
Citation	乳幼児発達臨床センター年報, 7, 17-25
Issue Date	1985-02
Doc URL	<a href="https://hdl.handle.net/2115/25214">https://hdl.handle.net/2115/25214</a>
Type	departmental bulletin paper
File Information	7_P17-25.pdf



## RELATION OF TEMPERAMENTAL DISPOSITION TO CLASSIFICATION OF ATTACHMENT : A PROGRESS REPORT

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This report will present the results of a longitudinal study of 41 firstborn Japanese infants growing up in urban middle-class nuclear families. These infants who have been followed from birth were observed in a standard Ainsworth Strange Situation when they were 12 months old. Thirty infants were classified as Type-B, 11 as Type-C (including 5 pseudo-Cs) and none as Type-A. Analysis of their behaviors in other situations reveals the following results : 1) From the infant's response to nipple removal in the newborn period and from home observation at 4 months of age, it would seem that smooth criers at the newborn period tend to become infants who cry less frequently and are easier to sooth. Eighty percent of the smooth criers became Type-B infants. 2) Observation of the infants' reaction to the entry of a stranger into the lab and also temporary separation from their mothers at 7.5 months, revealed more signs of fear for Type-C infants than for Type-B infants. 3) Analysis of 10 min. mother-infant interaction at 7.5 months revealed that the mothers of Type-C infants showed a lower level of interaction in comparison with the mothers of Type-B infants. (Perhaps this is because the infants were fearful and not responsive to their mothers.) Finally, the importance of having a clear picture of infant temperament  $\times$  maternal interactional style was stressed by presenting the data of 12 mother-infant pairs who were successfully tested at all the observation points in the first year of life.

Key words : infant temperament, mother-infant interaction, attachment classification, neonatal cry type, fearfulness.

### INTRODUCTION

Miyake et al. (1983) looked at a small group of infants (Cohort 1) soon after birth and then at intervals of three to four months in order to see whether temperamental dispositions at birth could be traced into later infancy, and secondly, how temperament contributes to the classification of quality of attachment. Because the study was longitudinal from birth, we expected that it would be possible to determine whether emotional reactivity in the neonatal period predicted later Strange Situation performance. Previous work with the Strange Situation had suggested that any factor likely to make the

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This research was supported by grants 803173 and 813083 from the Toyota Foundation : a grant in aid for scientific research 56310016 from the Ministry of Education, Science and Culture : a grant from the Japan Society for the Promotion of Science facilitating cross-national exchange between Japan and the United States and a grant from the Ministry of Welfare (Principal investigator : Noboru Kobayashi).

The authors would like to thank Professor Jerome Kagan and Professor Joseph J. Campos for their invaluable suggestions, and Ms. Donna L. Bradshaw, for her assistance and comments in data analysis. We also thank Kimiharu Satoh, Tatsuo Ujiie, Yuko Kanaya, Etsuko Ishikawa, Aoi Tamura and Mayumi Aida for data collection and analysis.

Strange Situation more stressful to the infant is likely to result in the infant being classified as a Type-C baby. Another factor influencing the stressfulness of the Strange Situation is the child's own endogenous threshold for distress. Individual differences in irritability have proven to be stable in the first year of life (Korner et al, 1981), and in some studies (e.g. Crockenberg, 1981 ; Waters et al, 1980) neonatal irritability has predicted subsequent C-like behavior. Accordingly, irritability was targeted for study in the neonatal period, with the expectation that the irritable infants would be more likely to be classified as Type-C at 12 months of age than the non-irritable infants.

In our study we took advantage of the fact that there are reliable individual differences in the level of stress caused when nursing is interrupted (Goldsmith & Campos, 1982). Specifically, we used the level of distress that newborns manifest when a pacifier nipple is removed, in order to predict their attachment behavior. When the infants were tested in the Ainsworth Strange Situation at 12 months of age, we found that the patterns of attachment displayed by nearly a third of them were classified as Type-C, while there were none who displayed a Type-A pattern of attachment. Moreover, we found that a large proportion of the infants who had been classified as Type-C had shown much crying in early infancy and extreme fearfulness in later infancy as compared to infants who had been classified as Type B.

Our findings indicate that some of the attachment difference attributed to the maternal behavior may arise from the infants' predispositions. Classification of behavior in the Strange Situation does not seem to be totally independent of the infants' temperamental tendencies. However, the likelihood of an interaction between the infant's temperament and the mother's practices can not be ruled out yet.

We have been testing two separate cohorts of infant-mother pairs, one from 1980, the other from 1982, in expectation of obtaining data relevant to several issues : confirmation of the findings obtained with Cohort 1 ; increase in the number of longitudinal subjects who are followed up from birth ; and interaction between infant temperament and maternal interactional disposition in accounting for the patterns of attachment at one year of age. We have already confirmed the findings from Cohort 1 regarding the distribution of A, B and C infants, using data from Cohort 2 (Miyake, 1984 ; Takahashi & Miyake, 1984).

In this progress report, we will mainly discuss two issues, namely : how early temperamental differences relate to Strange Situation attachment assessments ; and how some maternal interaction variables are similarly related to subsequent attachment. As for the second issue we will only present preliminary findings from the analysis in progress which is to be completed when we succeed in explaining the role of the mother's contingency and affective quality in interaction with her infant.

## **METHOD**

### **Subjects**

Forty-one infants (22 male, 19 female) were followed from birth to 12 months of age. Nineteen out of 41 infants were from Cohort 1, and the other 22 were from Cohort 2. All families contacted were predominantly urban middle class and each parent had at least a high school education. The fathers were engaged in white-collar or professional occupa-

tions, and the mothers, at the time of recruitment, planned not to be employed full time. Infants were firstborn with no serious pre- or perinatal complications. The number of subjects reported in the following sections varies from period to period, since not all subjects were successfully tested at each assessment.

### Procedures

Assessments were taken in the home at two, four and eight months, and at RCCCCD at seven-and-a-half, and twelve months. However, not all the measures will be discussed in this report. The following are the assessments to be discussed.

1. *Newborn assessments.* The reaction of infants to the interruption of sucking produced by the removal of a nipple [cf. Bell, Weller and Waldrop's (1971) RIS task] was chosen to assess neonatal temperament. RIS was administered twice, on the second and fifth day after birth, while both the infant and the mother were staying in the hospital. Five trials (Cohort 1) or eight trials (Cohort 2) were administered on each test day in the morning while the infant was not crying nor asleep, after the daily bath. The trials consisted of 20 second rubber nipple sucking and, 40 second reaction to nipple removal. The whole session was videotaped with audio recording. For further details concerning RIS, the readers are referred to Chen's paper in this volume (pp. 49-56).

2. *Four month home assessments (Cohort 2 only)* Two female research assistants visited each subject's home for about three hours. The behaviors of the infant while awake were observed and videotaped for a minimum of 90 minutes. The observers recorded the presence of preselected behaviors every 10 seconds using a checklist and a timer/signal producer. Among the categories employed were crying, fussing, negative vocalizations, smiling, laughing and explorations.

3. *Assessments at 7.5 months* Infants were tested for stranger and separation distress in a sparsely furnished room. No one else was present in the room. The procedure, which was videotaped, consisted of a series of six episodes :

- a. Baseline : 3 minutes, mother and infant interacted freely.
- b. Stranger entry : 2 minutes during which a male stranger approached to within 0.8 m of the infant, talked to both the infant and the mother, and then shook hands with the infant. The infant was sometimes picked up if it appeared to be too severely distressed.
- c. Mother departure : 2 minutes, leaving infant and stranger alone.
- d. Stranger departure : 2 minutes with the infant and the mother alone.
- e. Stranger re-entry : 2 minutes during which the stranger behaved as in Episode b, but without picking up the infant.
- f. Re-union with mother : 2 minutes, infant and mother interacted freely.

On the same day, another procedure was administered : a mother-infant interaction session. This was conducted in a different location and was completed before the six episode observation described above. The mother-infant interaction was videotaped in an unstructured free-play situation lasting for 10 minutes.

4. *Assessments at 12 months.* The Ainsworth Strange Situation assessment was conducted following the procedure described in Ainsworth et al. (1978). Episodes 4, 6 and 7 were curtailed if distress exceeded a maximum of 2 minutes. The Strange Situation assessment was videorecorded and a narrative account was audio tape-recorded, by

another independent observer.

## RESULTS

### *Attachment behaviors in the Strange Situation at 12 months*

In the previous report on our longitudinal study with Cohort 1, Miyake et al. (in press) predicted that the attachment classifications of Japanese infants in the Strange Situation would be very different from those in the United States. Miyake et al. specifically predicted a much higher proportion of C babies in the Japanese sample as compared with normative American ones.

This prediction was strongly supported. Miyake (1984) and Takahashi & Miyake (1984) reported in two cohorts (Cohort 1 & 2) that there were no A babies and approximately one third C babies (including a few "pseudo-C" babies who met some, but not all, of the criteria required for classification into C group), the rest being classified as B babies.

Table 1 presents the classification of forty-one infants who were followed from birth as subjects of Cohort 1 and 2 from our longitudinal study. As can be seen, the proportion of B and C infants is similar to what we found with the total sample (forty-one plus the supplemental subjects recruited either at 4 months or 11 months).

TABLE 1

Number & Percentage of Attachment Classification

attachment classification	infants followed from birth	infants followed from birth plus supplemental subjects
B	30 (73.2%)	39 (67.2%)
C	6 (14.6%)	14 (24.1%)
Pseudo-C	5 (12.2%)	5 (8.6%)

### *Neonatal cry type and mother-infant behavior characteristics at 4 months (Cohort 2 only)*

In the newborn period, the response of each subject to nipple removal was rated by three independent coders (for details of method of analysis, cf. Chen's paper in this volume). Among the subjects under study, 7 infants were rated as crying smoothly and 11 as effortfully. Of all the subjects whose data on both occasions (newborn and 4 months) were available, 7 infants were consistently classified as smooth criers and 11 as effortful criers. At 4 months, 5 of the 7 smooth criers were rated as having high soothability, 7 of the 11 effortful criers were rated as difficult to sooth. In terms of the number of 10 second epochs in which crying was observed, the smooth criers scored 14.3 (SD=6.7) whereas the effortful criers scored 30.1 (SD=18.1). These results seem to suggest that effortful criers at newborn period tend to become infants who cry more frequently and are difficult to sooth, whereas smooth criers at newborn period tend to become less frequent criers and are easier to sooth.

*Neonatal cry type and Strange Situation classification*

Of the forty-one infants studied, 32 infants were tested for RIS successfully during the neonatal period and then again at 12 months of age for attachment classification. The relation between their neonatal cry type and attachment classification was examined.

Of 15 infants who were classified as SO (smooth and organized) newborns, 12 became Type-B infants. However, of 17 ED (effortful and disorganized) newborns, only 10 were classified as Type-B, the remaining 7 being Type-C. From this finding, we may speculate that there is a significantly high possibility of an SO newborn becoming a Type-B one year old. However, ED newborns have a much higher probability of being classified as Type-C infants.

Maternal interactional style seems to play a more important role in the case of ED newborns than in the case of SO newborns. This issue is discussed later in this article.

*Antecedents of Strange Situation classification at 7.5 months*

Infant's behavioral disposition toward extreme fearfulness was measured at 7.5 months. Specifically, infants' reaction to a male stranger and to maternal separation was assessed.

A global judgement of 'Fearfulness' was derived, computed as the presence of avoidance and negative vocalization, together with a decrease in play behavior relative to the baseline prior to the stranger approach. The results are presented in table 2.

TABLE 2

Infant Fearfulness at 7.5 Months and Strange Situation Classification

Strange Situation Classification	Fearful	Not-fearful
B-type	9	14
C-type	9	2

chi square=3.86  $p < .05$

Nine out of 11 future-C (including 5 pseudo-C) infants were judged to be "fearful", whereas only 9 out of 23 future-B infants were similarly judged. The difference in incidence of "fearful" classification was significantly different ( $p < .05$ ) by chi square test.

Mother-infant interaction was also assessed at 7.5 months of age, and was coded from videotapes for level of interaction. Specifically, every 20 seconds, mother-infant interaction was coded as follows :

Level 0 : M→or I→ (M stands for mother, I, for infant.)

Level I : M→I or I→M

Level II : M→I→M or I→M→I

Level III : M→I→M→I……or I→M→I→M……

Thirty mother-infant pairs were classified into two types, namely, "interactive" and "non-interactive" by the median of the frequency of level III interaction.

To test the relationship between mother-infant interaction and type of attachment, Type-B and Type-C pairs were compared with respect to level of interaction. Twelve out of eighteen Bs versus two out of ten Cs showed a higher level of mother-infant interaction (Table 3). This suggests that the level of mother-infant interaction at 7.5 months was predictive of later type of attachment. However, six infants developed a secure type of attachment despite a low level of interaction and two infants developed an insecure type of attachment despite a higher level of interaction. One possible interpretation is that the infants' temperamental disposition played a role between these two variables. To test this possibility, the attachment types were broken down by the infants' degree of fearfulness measured at 7.5 months as well as by the level of interaction. Table 3 indicates that the level of mother-infant interaction was not the only factor in classification of infants into Bs or Cs several months later.

TABLE 3

Level of Mother-Infant Interaction & Infant Fearfulness at 7.5 Months as indicated by Attachment Classification

Future Classification in Strange Situation	High Level Interaction		Low Level Interaction	
	Fearful	Not-fearful	Fearful	Not-fearful
B-type	2	10	3	3
C-type	2	0	7	1

chi square=11.23  $p < .02$

If an infant was prone to distress and the level of interaction was high, fearfulness at 7.5 months did not seem to be related to the infant's being classified as Type-B or C. On the other hand, if an infant was a temperamentally calm baby, the possibility of the infant's being classified as Type-B seems to be high, regardless of the level of interaction. These results suggest to us that an infant temperament  $\times$  maternal behavioral style interaction merits further consideration. This issue is discussed further in the next section.

## DISCUSSION

Our preliminary findings indicate the possibility of a temperamental disposition toward irritability in early infancy and extreme fearfulness in later infancy, that make a contribution to the classification of quality of attachment. However, it is not yet clear how temperamental factors like irritability and fearfulness influence Strange Situation classification. Constitutionally-determined predispositions to become distressed are supposed in part to account for the infant's reaction to the stresses imposed in the Strange Situation. At the same time we feel that constitutional characteristics cannot fully account for the Strange Situation classification. More likely, temperamental and maternal variables interact to determine the patterns of attachment behavior.

Our data on the effects of the mother's mode of interaction at 7.5 months indicate that the effects of the level of interaction are indeed different, according to the degree of the infants' fearfulness. We feel that it is important to identify maternal variables that

maintain the infants' proneness to distress and to examine if there is any maternal variable that prevents the continued expression of irritability in some infants.

As a preliminary step to explore the way in which an infant's temperamental disposition acts upon maternal interactional style and vice-versa, we chose 12 mother-infant pairs (Cohort 2) who were successfully tested at each and all the observations in the first year of life (Table 4).

TABLE 4

## Infant Temperament, Maternal Interactional Style &amp; Attachment Classification

Subject Number	Neonatal Cry Type	Frequency of Cry (4 months)	Soothability (4 months)	Fearfulness (7.5 months)	Attachment Classification (12 months)	Level of Mother-Infant Interaction (7.5 months)	*Maternal Intrusiveness (7.5 months)
2107	SO	L	H	L	B2	H	L
2109	SO	L	H	L	B2	L	H
2111	SO	L	L	L	B2	H	L
2205	SO	L	H	H	B2	L	H
2105	ED	H	L	L	B3	H	L
2108	ED	H	H	H	B2	L	L
2113	ED	H	H	H	B3	H	L
2202	ED	H	L	H	B1	H	L
2103	ED	H	H	L	B4	L	H
2114	ED	H	L	H	PC	L	H
2115	ED	H	L	H	B4	L	H
2211	ED	H	L	H	C1	L	H

\* Any maternal behavior which both interrupted the baby's ongoing activity and also resulted in a change in the baby's behavior (such as crying, shift to playing with a new toy, etc.) without the baby having made any attempt to seek such intervention from the mother.

Of 12 infants included in this table, 4 are the infants who were classified as SO newborns and 8 were classified as EDs. In the group of 4 SOs, a clear and consistent thread of continuity was observed in the first year of life: At four months of age, they were non-crying and more soothable babies. At 7.5 months, three of them were not distressed by maternal separation and stranger approach. Finally, at 12 months in the Strange Situation, they were all minimally resistant to their mother and were classified as B2 babies. The two maternal variables — level of interaction and intrusiveness — (which were derived from the analysis of 10 minute mother-infant interaction at 7.5 months of age) do not show any consistent relationship to the continuity of the behavioral disposition of these infants.

Eight ED newborns can be classified into two different types of attachment at 12 months. Four of them (subject numbers 2105, 2108, 2113, 2202) classified as securely attached (B1, B2, B3), the other four (2103, 2114, 2115, 2211) classified as C1, Pseudo-C or B4. According to Ainsworth et al. (1978), B4 is clearly a "borderline" subgroup, being

Donna Bradshaw, Yuko Kanaya and Tatsuo Ujii are responsible for the subgroup classification. Ms. Bradshaw was trained in the system used at the University of Virginia, and the University of Utah. Ms. Kanaya and Mr. Ujii were trained by Ms. Bradshaw.

intermediate between B3 and C and Connell and Rosenberg (1974) suggested that B4 properly belonged in Group C. We feel that it is not inappropriate to call the latter four infants insecurely attached.

The maternal modes of interaction of these two subgroups of ED newborns were in striking contrast to each other. In the latter subgroup (C1, PC or B4), a clear and consistent thread of continuity in the infants disposition was observed in the first 12 months and the somewhat negative mode of mother's interaction seemed to play a role in maintaining the infants' proneness to distress. On the other hand, the positive mode of maternal interaction of the former subgroup (B1, B2, B3) possibly played a major role in preventing the continued expression of irritability in these four infants.

The analysis of the data on mother-infant interaction assessments in the home at 4 and 7.5 months of age for Cohort 2 infants will permit more objective assessment of both the affective quality of the mother's interaction with the infant, and the contingency of the mother's response to the infant's signals. A clearer picture of an infant temperament  $\times$  maternal interactional style will be obtained then.

Finally our research to date has documented the existence of some major differences in the Strange Situation performance of Japanese infants relative to those in Western countries. However, the greater incidence of Type-C infants in Japan does not in any way imply that Japanese infants are more likely to be "resistant/ambivalent" than their Western peers. Rather, it points out the importance of taking into account the cultural context of testing — especially the much greater stress produced among Japanese infants by even brief separations from the mothers (cf. Ujiié & Miyake paper in this volume).

It is necessary to review the total pattern of home and Strange Situation behavior in this study before it is possible to determine which pattern of attachment behaviors in the Strange Situation in Japan reflect emotionally unstable or problematic mother-infant interactions in the first year of life, and which patterns predict subsequent social and cognitive competence.

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