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SEPARATION DISTRESS OF JAPANESE INFANTS IN THE STRANGE SITUATION

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Fifty-six Japanese infants and their mothers were observed in the Strange Situation. By using the vocalization measure adopted from Thompson and Lamb (1984), distress intensity of infants in the Strange Situation was assessed. Japanese infants tended to be less distressed than the U.S. infants in Thompson and Lamb except episode 6. This result indicated that Sroufe's criticism (1985) that the Strange Situation was overstressed for Japanese infants was inappropriate. To examine further the validity of Sroufe's criticism, the relation of distress intensity in separation episode of the Strange Situation and separation experience was assessed. However, no significant relation was obtained. On the other hand, a significant continuity of separation distress from 7.5 months to 12 months was found. This result suggested that separation distress was a temperamental characteristic and could not be accounted for by the amount of separation experience. And the distress intensity in the Strange Situation was significantly associated with the social interactive behaviors during the two reunion episodes. A significant consistency of infant's behaviors between episode with stranger and episode with mother was also obtained. These results altogether indicated that temperamental characteristics affect the quality of attachment classified by the Strange Situation procedure.

key words : separation distress, separation experience, attachment, temperament.

Since 1980, the Hokkaido University group had been carried out a longitudinal study consisted of two cohorts. Miyake, Chen, and Campos (1985) reported the main findings of cohort 1. However, not all investigators of attachment accepted Miyake et al.'s findings. Sroufe (1985) explicitly questioned the validity of the Strange Situation procedure conducted in Hokkaido University. Sroufe regarded the Strange Situation as overstressed for Japanese infants for two reasons. One was that the traditional Japanese mother never left her infant. Thus the Japanese infant never experienced any separations from his/her mother. The other was that the Hokkaido University group allowed the separation to go on for 3 minutes regardless of amount of distress. Due to these reasons, Sroufe inferred that the Strange Situation was overstressed for Japanese

infants. Sroufe, however, did not present any evidence in favor of his argument.

The purpose of this paper is to examine Sroufe's criticism toward the Hokkaido University Longitudinal Study. In order to judge Sroufe's criticism, at least two kinds of data are required to examine. Firstly, it is necessary to compare the emotional responses of Japanese infants in the Strange Situation with that of the U. S. infants. These data will tell us whether Japanese infants, compared with the U. S. infants, are so upset or distressed that the assessment of attachment quality can be invalid. Thompson and Lamb (1984) studied that the relation between attachment and emotional responses in a sample of 43 U. S. infants. They assessed the infant's emotional responses by the vocalization and the facial expression measure. The vocalization measure of Thompson and Lamb was employed in this study, because the vocalization measure, unlike the facial expression measure, is available even when the infant's face turns away from the camera.

Secondly, the relation between the quality of emotional responses in the Strange Situation and the amount of separation experience should be examined in Japanese infants. Is less separation experiences in everyday life likely to produce stronger separation distress in the Strange Situation? Infant research on the effect of separation experience on separation distress yielded inconsistent results. Tulkin (1973) found that infants of employed mothers, compared with infants of nonemployed, had lower levels of separation protest and suggested that extensive separation experience may make separation easier. On the other hand, Kagan, Kearsley, and Zelazo (1978) found no difference between home-cared infants and infants who had been in full-time day care since 4 months of age. Jacobson and Wille (1984) found that separation experience, measured by hour per week in extrafamilial child care, was related to separation time spent playing during separation episodes in the Strange Situation in a curvilinear fashion. However, no relation of separation experience and time spent crying during separation episodes was found. These results seem not to permit any simple conclusion about the relationship between separation experience and separation distress.

A second purpose of this paper is to ask whether the B4 infants should be classified as securely attached infants or not. Durrett, Otaki and Richards (1984) reported that 62% of their Japanese sample were classified as "B", and 18% as "C". The proportion of each attachment type in the Durrett et al.'s sample was different from the proportion of the Hokkaido University sample, but was rather comparable to the proportion of the U. S. samples. Sroufe considered Durrett et al.'s result as a support to his doubt of the validity of the Strange Situation procedure in Hokkaido University. Although 62% of Durrett et al.'s sample were classified into the B group, about a half of the B group were B4. And the proportion of the B4+C group in the Durrett et al.'s sample was 46%, which was almost the same as the proportion of the equivalent group in the Hokkaido University sample (40%). Thus the question about the status of the B4 group will be important in considering the validity of the findings of the longitudinal studies in Hokkaido University.

METHOD

Subjects

Subjects that participated in the Hokkaido University Longitudinal Study were observed at 7.5 months and 12 months. At 12 months 57 infants (28 from Cohort 1 and 29 from Cohort 2) were observed. At 7.5 months 38 infants (15 from cohort 1 and 23 from cohort 2) were observed. (see Miyake (1986) for further information).

Procedures

Assessments reported in this paper were conducted as a part of the Hokkaido University Longitudinal Study.

1) *Assessment at 7.5 months.* Infants were tested for reactions to stranger and separation in a sparsely furnished room. The procedure consisted of a series of 6 episodes: (a) baseline (3 min.), (b) stranger entry (2 min.), (c) mother departure (2 min.), (d) mother reunion and stranger departure (2 min.), (e) stranger reentry (2 min.), and (f) reunion with mother.

In episode (b) and (c) infant's peak distress intensity was assessed by the vocalization measure of Tompson and Lamb (1984). The vocalization measure was a 13-point measure for assessing variation in infant vocal activity, with an emphasis on distress vocalization. To create summary measures of peak distress intensity, the vocalization measure was collapsed into seven levels ("0" is the lowest value and "6" is the highest value). For rating, a 15-sec interval rating procedure was used. A measure of peak distress intensity was assigned for each episode as the highest rating obtained by the infant.

Since episode (b) is equivalent to episode 3 in the Strange Situation at 12 months, episode (c) to episode 4, assessing the infant's peak distress intensity both in episode (c) at 7.5 months and in episode 4 at 12 months made it possible to assess the temporal stability of separation distress. Interrater agreement for episode (c), based on the video protocols of 10 infants, was 90%.

2) *Assessments at 12 months.* The Ainsworth Strange Situation procedure was conducted. The procedure consisted of a series of 8 episodes. Episode 4, 6 and 7 were separation episode, and episode 5 and 8 were reunion episode. Three kinds of data were obtained. The first was a classification of the security of attachment. The second kind of data consisted of episode-by-episode rating of the infant's social interactive behaviors directed to mother or stranger. There were altogether five interactive variables, each scored on a 7-point scale. They covered the infant's (a) proximity-seeking and contact-seeking behaviors, (b) contact-maintaining behaviors, (c) resistance to interaction or contact, (d) avoidance of social interaction, and (e) distance interaction (e.g., smiling, vocalizing, showing of toy, etc.). A third kind of data was episode-by-episode assessment of the infant's peak distress intensity by the method used at 7.5 months.

The rating of the social interactive behaviors was performed by two raters working independently. Agreement for them was over 95% in all (ratings that are different at 1 point between the two raters were also considered as "agreed"). The median percentage of agreement for the assessment of infant's peak distress intensity, based on

the videotape protocols of 10 infants, was 80%.

On the same day, An interview to mothers was conducted (N=29, cohort 2 only). Mothers were asked to estimate the frequency of their going out without their infants per month.

RESULTS

Distress intensity in the Strange Situation

Table 1 shows the distress intensity of two samples; the Hokkaido University sample and the Thompson and Lamb (1984) sample from episode 4 to episode 8. Following Thompson and Lamb, the B group was divided into two subgroup clusters (i. e., B1+B2 and B3+B4) to create three comparison groups. One-way analyses of variance with Tukey's post-hoc pairwise comparisons were conducted. The results were presented in Table 1. These analyses revealed significant overall differences on distress intensity for each episode. The pairwise comparisons revealed that the B3+B4 group was indistinguishable from the other group except episode 8. This result was inconsistent with the result of Thompson and Lamb (1984). They found significant differences between the B1+B2 group and the B3+B4 group in distress intensity and other emotion variables, and argued that there were two clusters in emotional expression: those in groups A, B1, and B2 on one hand, and those in group B3, B4, and C on the other. This study, however, failed to confirm significant difference of the B1+B2 group and the B3+B4 group in distress intensity. Fig. 1 is a frequency block chart which shows the function of attachment types with the distress intensity of episode 8. Only episode 8 was comparable to the Thompson and Lamb's results in the present study. Nevertheless, Fig. 1 shows that there is a continuous distribution of infants and there is a substantial variability of distress intensity within a attachment group or subgroup. This distribution indicated that there was no natural clusters, and any segmentation of attachment groups or subgroups by distress intensity was artificial.

Comparing Japanese infants with the U.S. infants did not confirm that the Strange Situation was overstressed for Japanese infants. In episode 6 Japanese infants tended to be more distressed than the U.S. infants, but less distressed in the other episodes.

By the way, Sroufe (1985) criticized that separation episode in the Hokkido

TABLE 1
Relations Between Attachment Classifications and Distress Intensity in the Strange Situation

	B _{1,2} (n=22)	B _{3,4} (n=17)	C (n=17)	F	P
Ep. 4	2.77a (2.50)	3.41 (5.06)	4.24a (5.33)	5.38	<.01
Ep. 5	2.41a (2.50)	2.88 (4.25)	3.63a (5.00)	5.18	<.01
Ep. 6	5.00a (4.14)	5.19 (5.44)	5.63a (5.50)	5.16	<.01
Ep. 7	4.24a (3.36)	4.88 (5.12)	5.47a (5.17)	7.50	<.01
Ep. 8	2.82ab (2.86)	3.94a (4.69)	4.38b (5.17)	12.05	<.0001

Note: Means sharing the same subscript differed significantly from each other ($p < .05$). The values in parentheses were the values of Thompson and Lamb (1984) sample.

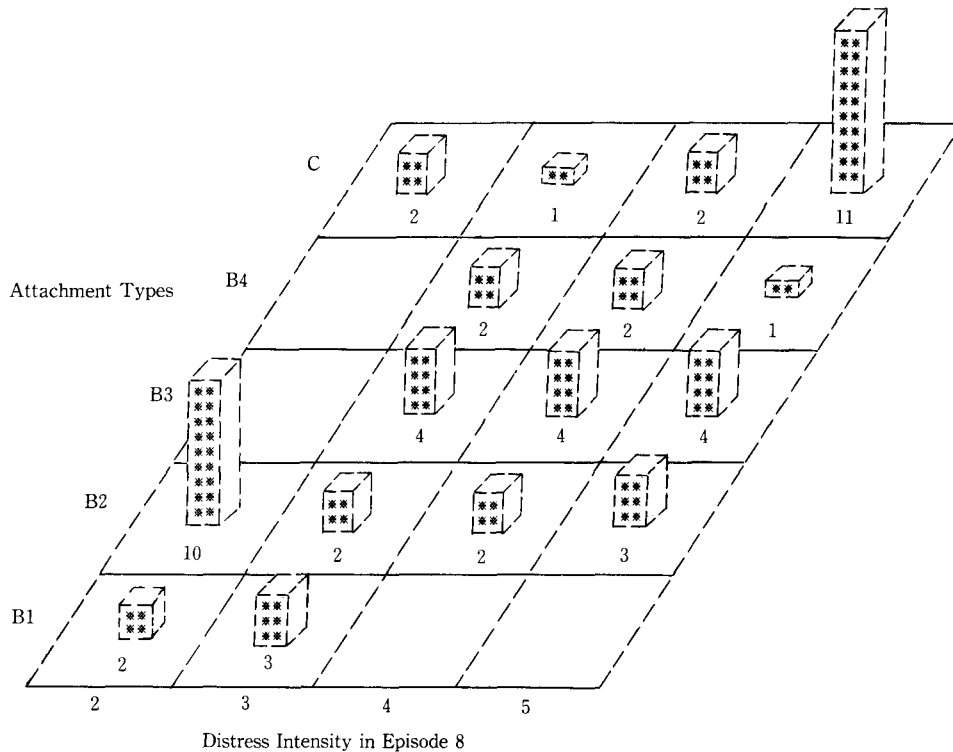


FIGURE 1 Frequency Block Chart Which Shows the Function of Attachment Types with the Distress Intensity in Episode 8.

University study went on for 3 min regardless of the amount of distress. Since Sroufe criticized toward the cohort 1 study, the number of units (1 unit=15 sec.) of episode 6 in cohort 1 sample was calculated. The mean unit number was 8.5 units (127.5 sec.), ranging from 4 units to 13 units. Sroufe's assertion of going on for 3 min in episode 6 was groundless.

Relation between distress intensity and social interactive behaviors in the Strange Situation

TABLE 2

Episode-by-Episode Correlations Between Distress Intensity and Social Interactive Behaviors

	Ep. 4	Ep. 5	Ep. 7	Ep. 8
Proximity seeking	-.21	.41**	-.54***	.28*
Contact maintaining	.45***	.57***	-.04	.47***
Resistance	.80***	.50***	.50***	.50***
Avoidance	.60***	-.39**	.43**	-.20
Distant interaction	-.63***	.10	-.69***	-.57***

* $p < 0.5$ ** $p < 0.1$ *** $p < .001$

Table 2 shows the correlations between distress intensity and social interactive ratings within the same episodes. Three stranger-directed interactive ratings showed the strong association with distress intensity during separation episodes. Resistance and avoidance were positively associated with distress, and negatively associated with distant interaction. Three mother-directed interactive ratings— contact-seeking, contact-maintaining and resistance— were positively associated with distress intensity during reunion episodes.

Table 3 shows the correlation between the distress intensity in a separation episode and the mother-directed interactive ratings in a reunion episode immediately after the separation episode. Contact-maintaining and resistance during reunion episodes were positively correlated with distress intensity in separation episodes. These results indicated that separation distress affected two aspects— contact-maintaining and resistance— of interactive behaviors during reunions.

Furthermore, to assess the relation between the mother-directed behaviors and the stranger-directed behaviors, Canonical correlation analyses were conducted (Canonical correlation analysis is appropriate to explore the relationship between two sets of variables). The canonical correlation between the five social interactive behaviors in episode 4 and the five social interactive behaviors in episode 5 was significant ($R=.79$, $p<.001$) on the other hand, a significant canonical correlation of .76 ($p<.001$) was also obtained for episode 7 and episode 8. Infant's behaviors in the Strange Situation were consistent regardless of the interaction with two adults.

Continuity of Separation distress from 7.5 months to 12 months.

The correlation of distress intensity in episode 4 of the Strange Situation at 12 months and distress intensity in episode (b) of 7.5 month procedure was significant ($r=.35$, $p<.05$). A significant continuity of separation distress from 7.5 months to 12 months was obtained.

Relation of separation distress and separation experience at 12 months

Separation experience of infant was assessed by asking mother to estimate the frequency of her going out without her infant per month. Separation experience was not significantly correlated with any separation distress variables in the Strange Situation ($r=-.05$ for episode 4, $r=.15$ for episode 6, $r=.22$ for episode 7). Multiple

TABLE 3

Correlations Between Separation Distress before Reunion on Episodes and Social Interactive Behaviors During Reunion Episodes

	Proximity seeking	Contact maintaining	Resistance	Avoidance	Distant interaction
The first reunion episode (Ep.5)					
Ep. 4	.58***	.72***	.53***	-.39**	.19
The second reunion episode (Ep. 8)					
Ep. 6	-.03	.33*	.30*	-.03	-.30*
Ep. 7	.02	.31*	.41**	-.22	-.44***

regression analysis was also conducted to find a curvilinear relation between separation experience and separation distress, but no significant relation was found.

The status of the B4 group

To answer the question whether the B4 group was a securely attached group or not, a spatial approach was adopted. In the case where only two variables are being measured, each subject is easily plotted in two-dimensional space. We can judge which group a subgroup should be classified into by only looking at the two-dimensional plot of subjects. In the case where more than two variables are being measured, a substitute in n-dimensions for what scatter diagrams procedures in two dimensions is needed. Principal component analysis is a good substitute for them, because principal component analysis is well known as a useful method to reduce the number of variables (e.g., Stevens, 1986). By carrying out principal component analysis, each subject is able to be plotted on the two-dimensional space where the first two principal components are considered dimensions.

A principal component analysis of five interactive variables in episode 8, which was the most important episode to classify subjects into one of the A, B, and C group, was conducted. The results are presented in Table 4. Fig. 2 is the scatter diagram of the first two principal components. Fig. 2 shows that the B4 group is not distinguishable from the C group, but distinguishable from the other B group. This result indicated that the B4 group was very resemble to the C group with respect to the interactive behaviors of episode 8.

DISCUSSION

The purpose of this paper was to assess Sroufe's criticism (1985) toward the Hokkaido University Longitudinal Study.

Is the Strange Situation overstressed for Japanese infants to be impossible to assess their quality of attachment? The present data contradicted Sroufe's argument that the Strange Situation was overstressed for Japanese infants. In spite of being more distressed in episode 6, Japanese infants could recover during episode 8. In epi-

TABLE 4
Principal Component Analysis

	Eigenvalue	Proportion	Cumulative
First principal component (Prin 1)	2.10	.42	.42
Second principal component (Prin 2)	1.25	.25	.67
Third principal component (Prin 3)	.77	.15	.82
	Eigenvectors		
	Prin1	Prin2	Prin3
Proximity seeking	.30	-.55	.69
Contact maintaining	.56	.02	-.44
Resistance	.43	.43	.47
Avoidance	-.32	.64	.34
Distant interaction	-.55	-.31	.09

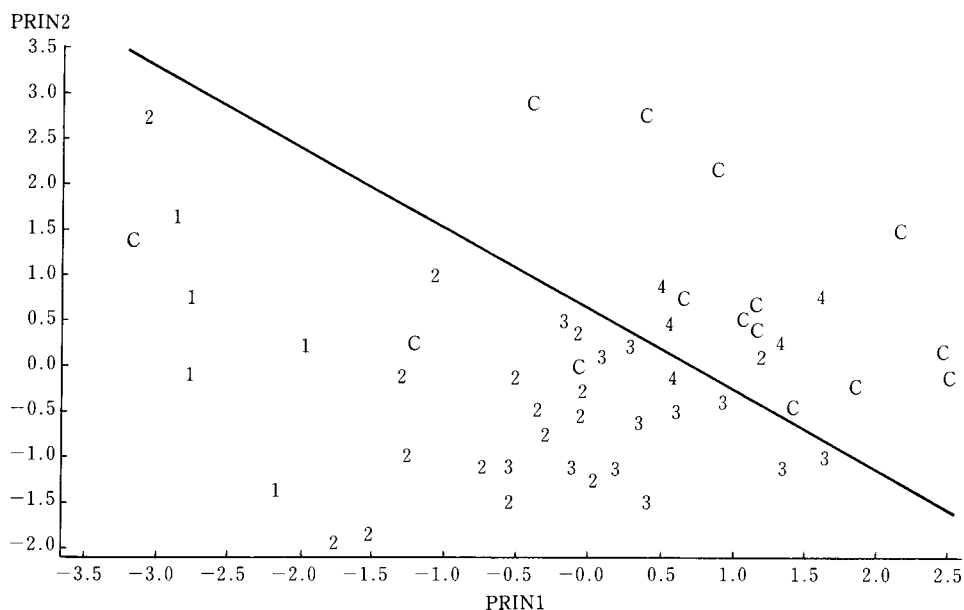


FIGURE 2 Plot of the First Principal Component versus the Second Principal Component.

Note: 1=B1, 2=B2, 3=B3, 4=B4, C=C. Four subjects were hidden. The diagonal separates between B4, C and B1, B2, B3.

sode 8 which is the most important episode to decide the attachment type, the distress intensity of Japanese infants was less than that of the U. S. infants.

The present result revealed that there was a temporal stability of separation distress. Since the definition of temperament demands a temperamental characteristic to be some stable across time (Goldsmith & Campos, 1982), the finding of a significant continuity of separation distress was meaningful. On the other hand, no relation between separation distress and separation experience was found. Although a strong conclusion that separation experience does not affect separation distress can not be made here since the data about separation experience collected in this study is not comprehensive enough, results of the preceding studies including the present one indicate that it is inappropriate to suppose any simple relation between them. In other words, the relation between these variables is still obscure. Since Sroufe's criticism that the Strange Situation is overstressed for Japanese infant is based on the assumption that there is a linear simple relation between separation distress and separation experience, we can say that this assumption has a very weak base.

Another basis which Sroufe criticism depended on was also groundless: the separation episode in the Hokkaido University study went on for 3 min regardless of the amount of infant distress, rather than cutting the separations short. In fact episode 6 was shortened when an infant was heavily distressed.

Principal component analysis indicated that the B4 group was close not to the other B subgroups but to the C group, and the B4 and C groups could be considered as one group. The proportion of the B4+C group of the Hokkaido University sample is comparable to that of Durrett et al.'s sample. In other words, the higher proportion of

the C group was not a unique finding of the Hokkaido University study in case that The B4 group and the C group are one group. In sum Sroufe's criticism was off the point, and it's ground was not sound or originated from misunderstanding.

On the other hand, the effect of emotion, especially separation distress, on interactive behaviors in the Strange Situation was clearly demonstrated. The separation distress made the levels of both contact-maintaining and resistance during reunion episode increase. Since the higher levels of contact-maintaining and resistance during reunion episode are important characteristics of the C infant, this result indicates that the individual differences in separation distress affect the classification of attachment. A significant consistency of infant's behaviors between episode with stranger and episode with mother was also obtained. The view that the quality of attachment is attributed to a history of mother-infant interaction, that is the relational view of attachment classification, does not account for this consistency. This result indicated the important effect of emotion on social interactive behaviors in the Strange Situation.

The final point is about the assertion of Thompson and Lamb (1984) that there is two clusters on emotional expressions in the Strange Situation. Thompson and Lamb created two clusters by comparing group means. The findings of significant differences between the B1,2 group and the B3,4 group on emotional variables urged them to assert that infants could be split into two cluster (the A-B1-B2 group and the B3-B4-C group). However, this result was not replicated in the present study. In addition comparing group means is a very weak method to identify clusters if a concept of cluster is to contribute something beyond high and low scores on a variable. Although a preference for making clusters (i.e., the typological approach) is persistent among psychologists, it should be noted that not all collections of subjects can be clustered. For example, if the distribution of subjects on a variable is normal or at least unimodal, any "clustering" of subjects on the variable is a mere artificial segmentation. The distribution of distress intensity found in this study suggests that the typological approach is ill-suited to emotion variables. There seems to be no reason that psychologists rely on the typological approach at this time when psychologists can arm with a variety of measurement scales, multivariate statistics, and experimental manipulations.

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