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Author(s)	TAJIMA, Nobumoto
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INFANT'S TEMPERAMENTAL DISPOSITION,  
ATTACHMENT AND SELF-RECOGNITION  
IN THE FIRST 20 MONTHS OF LIFE

Nobumoto Tajima  
*Hokkaido University*

The aim of this article is to investigate whether (1) the infant's early social interaction with his mother, and (2) the infant's temperamental characteristics, such as inhibition, affect the development of infant's self-concept. In study 1, the relationships between infants' attachment relation to their mothers at 12-months and individual differences in visual self-recognition behavior at both 16- and 20-months were examined. Contrary to the hypothesis, insecurely attached infants exhibited early self-recognition as compared with securely attached infants. In study 2, the level of infant inhibition obtained from the observation of infants' behavior to both their mothers and a male stranger at 7- and 11-months, were compared with attachment type at 12-months and also with individual differences in self-recognition at 16- and 20-months. Inhibited infants, who were more likely to be insecurely attached, also were more likely to be early self-recognizers. These results were interpreted in terms of the concept of vigilance.

Key words : temperamental disposition, inhibition, vigilance, attachment, self-recognition.

As self-concept in children is considered to play an important role in their cognitive and socio-emotional development (e.g. Lewis & Brooks-Gunn, 1979a; Kagan, 1981), the development of self-concept has received increasing attention from psychologists in many areas. Among studies of self-concept, recent studies of visual self-recognition indicate consistently that capacity for self-recognition, as measured by the infant's touching his own marked feature in his face instead of the mirror image, first appears around 15 months of age, and by the end of the second year of life most normal children show mark-directed behavior (Lewis & Brooks-Gunn, 1979b; Bertenthal & Fischer, 1978; Papoušek & Papoušek, 1974; Gallup, 1979).

While some descriptive data exist to show developmental trend of self-

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recognition, little is known about the origins of self-recognition and individual differences in the development of self-recognition. In other words, we know very little about the process of the development of self-concept in early childhood.

Hypotheses have been suggested to account for the possible causes of the emergence of individual differences in self-recognition. Some researchers emphasized the importance of the role of the child's cognitive maturation (Crook, 1980; Kagan, 1981), while the importance of early social interaction between infants and their parents has also been suggested, mostly from a theoretical point of view (Cooley, 1902; Mead, 1934; Piaget, 1976; Lewis & Goldberg, 1969; Mahler, Pine & Bergman, 1975).

Concerning the role of cognitive development, some empirical data have been reported, indicating the relationship between the development of self-recognition and perceptual-cognitive abilities or mental age, although the process is not specified (Lewis & Brooks-Gunn, 1979b; Brooks-Gunn & Lewis, 1980). With regard to social interaction hypothesis, however, there is no empirical data to support it.

Theoretically, it is possible to consider that infant's own sensory-motor activities toward their environment are very important in obtaining a sense of self. Environmental feedback to the infant's activities leads to what Watson called "awareness of contingency" (Watson, 1966, 1973), or White's "effectance motivation" (White, 1959). In other words, these concepts suggest that the development of a sense of self can be facilitated by the responsiveness of either the objective or the social environment of the infants (Lewis & Goldberg, 1969). In fact, the above thinking is not new, for Mead has implied in his "symbolic interactionism" the importance of the role of early social interaction in the formation of the self-concept (Mead, 1934).

The aim of this article is to examine whether the infants' early relationship with their mothers is related to later individual differences in the emergence of self-recognition.

Ainsworth reported that early mother-infant interaction, especially mothers' responsiveness to their infants, was closely related to the infants' attachment to their mothers (Ainsworth, Blehar, Waters & Wall, 1978). According to this view, it is expected that, securely attached infants, who are supposed to have a responsive environment, will be early self-recognizers as compared with insecurely attached infants who had less contingent feedback in their social interaction with their mothers. In order to examine this hypothesis, first, infants' attachment to their mothers were measured at 12 months of age, and then, at 16- and 20- months the same infants were observed in mirror recognition task situation (see Lewis & Brooks-Gunn, 1979b).

## STUDY 1

### *METHOD*

*Subject:* The sample consisted of 29 first born infants and their mothers of middle class families (12 male and 17 female). They were observed at 12-months. Twenty six of those infants (9 male and 17 female) were observed at 16-months, and 23 (7male and 16 female) were observed again at 20-months. They were the participants in a longitudinal study of infant's social development (Miyake, Chen, Ujiie,

Tajima, Satoh & Takahashi, 1983). The number of subjects reported here varies from period to period, because not all subjects were successfully tested at each age.

*Procedure 1: Assessment of attachment at 12-months*

Mother-infant interaction was observed in the Ainsworth Strange Situation (Ainsworth et al., 1978). The whole procedure was video-tape recorded, together with narration of infant's behavior to his mother and to a female stranger, made by a trained observer through a one way mirror in an adjacent room. The infant's behavior was coded during a free play situation with the mother, during the separation episodes with the stranger or without her, and during the first and the second reunion episodes according to procedures described by Ainsworth, et al. (1978). The classification of infant-mother attachment is also based on that of Ainsworth, et al. Classification was carried out by experienced researchers, with partial confirmation by experts in this issue and reasonable interobserver reliability was obtained (Takahashi & Miyake, 1982).

*Procedure 2: Assessment of visual self-recognition*

Infants were observed twice, at 16- and 20-months in the mirror recognition procedure (Lewis & Brooks-Gunn, 1979b). Each infant was placed in front of a one way mirror, and the infant's behavior was video-tape recorded from an adjacent observation room. After appearing in front of the mirror for several minutes, the infant was moved away from the mirror. A odorless color dye was applied to the infant's cheek by the mother without the infant's knowing it. The infant was then placed back in front of the mirror for 30 seconds.

The infant was judged as a self-recognizer when he/she showed mark-directed behavior (Lewis & Brooks-Gunn, 1979b). For mark-directed behavior, interobserver reliability obtained by two coders who were uninformed as to the infant's attachment classification was .98.

## RESULTS

Of the 29 infants observed at 12-months, 19 (65.5%), 9 male and 10 female, were classified as "B" babies ("securely attached"). Ten (34.5%), 3 male, 7 female, were classified as "C" babies ("insecurely attached"). Though no infants were classified as "A" and many more infants were classified as C-type, as compared with the Caucasian middle class sample in the United States (e.g. Main & Weston, 1981), the proportion of securely and insecurely attached babies are similar to that of the American sample.

Figure 1 shows the proportion of the subjects who produced mark-directed behavior, that is, who were judged as self-recognizers at each age level. A significant increase in mark-directed behavior was seen between 16- and 20-months. While only 23.1% of the infants exhibited this behavior at 16-months, 43.5% of the sample displayed mark-directed behavior at 20-months ( $CR=1.81$ ,  $P<.05$ ). This result is congruent with other studies (see Lewis & Brooks-Gunn, 1979b for a review).

Figure 2 shows the proportion of subjects who were judged to be self-recognizers at each age level by attachment grouping. Differences in the proportion of self-recognizers can be seen between the two attachment groups at each age level.

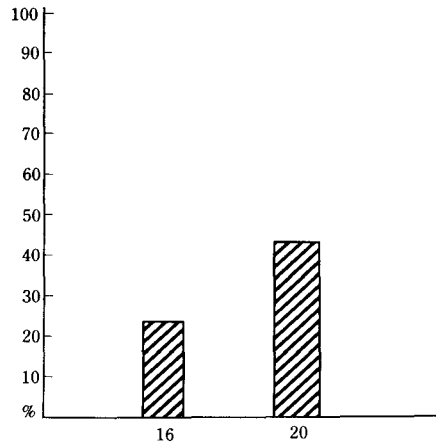


FIGURE 1 Proportion of self-recognizers in total sample at 16- and 20-months

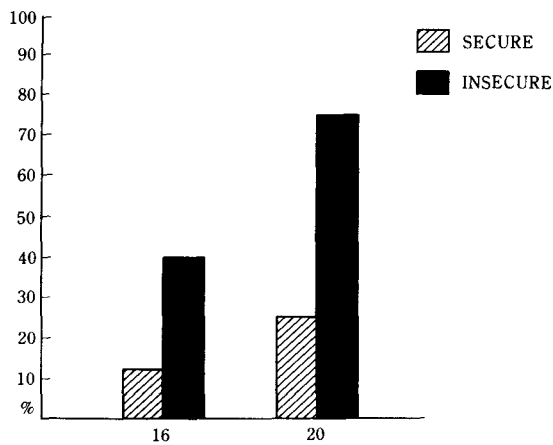


FIGURE 2 Proportion of self-recognizers by attachment group at 16- and 20-months

Although not significantly different, 40% of the C infants were already self-recognizers at 16-months as opposed to 12.5% of the B infants ( $\chi^2=3.222$ ,  $df=1$ ,  $P<.10$ ). When the infants were 20 months of age, the C infant group produced significantly more mark-directed behavior than the B infants, that is, while only 26.5% of the B infants exhibited mark-directed behavior, 75.0% of the C infants displayed that behavior ( $\chi^2=4.959$ ,  $df=1$ ,  $P<.05$ ). These results suggest that, as compared with the securely attached babies, the insecurely attached babies tended to be early self-recognizers.

## DISCUSSION

The most interesting finding in the first study is the fact that contrary to the hypothesis, "insecurely attached" infants showed earlier self-recognition than "securely attached" infants. This, however, suggests that the infants' early social relationship influences the individual differences in the emergence of self-recognition.

Why are the insecurely attached infants early self-recognizers as compared with the securely attached infants? One of the possible explanations can be derived from the view that infants' relationship with their mothers only is responsible for the emergence of self-recognition, that is, insecure rather than secure attachment facilitates the capacity for self-recognition.

From the attachment theory point of view, infants who have less responsive mothers, were less likely to form a secure base, and were more likely to be separated from their mothers. This may result in infant's alertness especially in an unfamiliar event, and his/her persistency in attempting to comprehend discrepancy, as the cases of the abused or neglected children who tend to pay more attention to their environment than normal children (Belsky, 1978; Lewis & Schaefer, 1981). This tendency is called vigilance (Garcia-Coll, Kagan & Reznick, 1983). Vigilance will facilitate the differentiation between the infant himself and his environment, and can thus be considered to contribute to the infant's early emergence of self-recognition.

While it is generally believed that successful parenting, such as mothers' responsiveness to their children's activities, usually leads to the children's higher competence, however, less effective and irresponsive parents may sometimes facilitate their children's development, for irresponsive parenting is related to the children's endurance or their capacity for delay of gratification (Yarrow, Rubenstein & Perdersen, 1975).

An alternative explanation for the relationship between insecure attachment and early self-recognition comes from the view that the infant's own characteristics affect the infant's perception of the environmental stimulation in social interaction.

If the infant's tendency to be vigilant is related to early self-recognition, infant temperamental characteristics will also lead to the early appearance of self-recognition, because the tendency to be vigilant, in part, can be affected by the infant's temperamental disposition. In fact, several researchers have suggested that temperamentally fussier infants tend to show more fearful behavior to a stranger at 8- or 9-months (Scarr & Salapatek, 1970; Paradice & Curcio, 1974; Berberian & Snyder, 1982). Inhibition is another temperamental characteristics which is closely related to vigilance (Garcia-Coll et al., 1983). If the above inference is correct, inhibited infants will be early self-recognizers.

Besides, some researchers indicated that a close relationship existed between individual differences in infant's temperamental characteristics during the neonatal period and later infant's attachment classification (Waters, Vaughn & Egeland, 1980; Crockenberg, 1981; Miyake et al., 1983). In particular, Miyake, et al. reported that infants classified as insecurely attached at 12-months were generally more inhibited or fearful in reaction to a stranger at 7-months, and tended to be more anxious in a free play situation at 11-months.

From these findings, when considered together with the results of relationship

between attachment and self-recognition in study 1, it can be considered that the infant's temperamental disposition such as inhibition would mediate the relationship of insecure attachment to early self-recognition. However, there are no data indicating the relationship between temperament and self-recognition directly. Thus, the aim of the second study in this article is to examine whether the infant's inhibited behavior is related to his subsequent self-recognition. To test this hypothesis, infant's temperamental disposition such as inhibition was obtained by observing the infant's reaction to a stranger at 7-months and infant's behavior in the laboratory play situation at 11-months. These infant's temperamental characteristics were considered together with his later self-recognition as observed in study 1.

## STUDY 2

### *METHOD*

*Subjects*: Subjects involved fourteen infants (5 male and 9 female) and their mothers. These mother-infant pairs were the same as those observed in Ainsworth Strange Situation at 12-months and also in the mirror recognition task at 16- and 20-months, as reported in study 1.

*Procedures*: Each mother-infant pair was observed in a strange situation when the infant was 7 months. This strange situation procedure consisted of series of six episodes. After the baseline session (Episode 1), where only the mother and her infant were sitting face to face for 3 minutes, a male adult stranger entered the room. He began to approach, to speak, to touch, and sometimes to take the infant's hands (Episode 2, 2 minutes). This was followed by the mother's leaving the room (Episode 3, 2 minutes). One minute later she reappeared (Episode 4, 2 minutes). The stranger then left the room for one minute (Episode 5, 2 minutes). He entered the room again for the second time (Episode 6, 2 minutes).

The infant's behaviors in reaction to the stranger were videotaped. The tape was later coded for the following infant behaviors: avoidance, approach, negative vocalizations (e.g. fussing), crying, and inhibited behavior (e.g. stop playing when the stranger enters). In addition, continuous heart rate was monitored during the entire session, although HR data will not be dealt with in this paper.

The infants were again observed at 11-months in free play situation in the laboratory. The infant was given several toys and was asked to play with them alone at the center of the room. The mother sat in the corner and talked with a female experimenter. The mother was instructed not to interact with her infant unless necessary during the entire 10 minute session. Infant's behavior was videotaped and later coded for such variables as, number of toys used, varieties of manipulation per minute, mean duration of play with one toy, number of times the infant interrupted a play activity to approach the mother, and mean duration of continued play without approaching to the mother. The infants were classified into inhibited infants and uninhibited infants, based on the results of the above procedure in both the strange situation at 7-months and, in the free play situation at 11-months (see Miyake et al., 1983).

The inhibited infants were characterized as more anxious and showing such

behaviors as avoid a stranger, approach the mother, stop playing when the stranger entered, or when the mother left the room. They also showed a higher and more stable heart rates (Kagan, 1982) in comparison with the uninhibited infants. Interrater reliability by two independent raters was 1.00 for the classification of inhibited group.

### RESULTS

According to the results of the observations of 14 infants at 7-, and 11-months, 8 infants (57.1%), 3 male and 5 female, were classified as inhibited infants, and 6 infants (42.9%), 2 male and 4 female, were classified as uninhibited infants.

Figure 3 shows the proportion of the attachment grouping by level of infant inhibition. Although not significantly different, because of small sample size, 75.0% of the inhibited infants (6 out of 8) were "C" infants, while 83.3% of the uninhibited

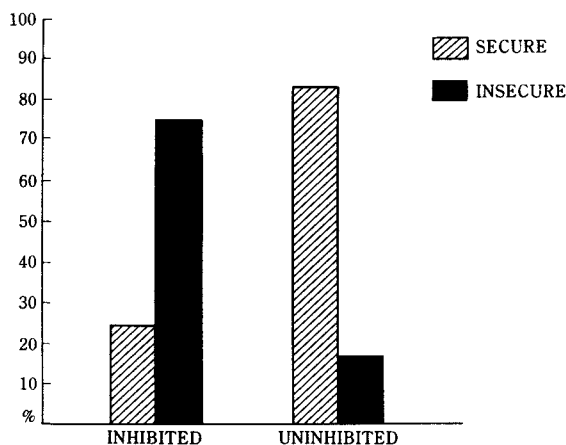


FIGURE 3 Proportion of attachment group by level of infant inhibition

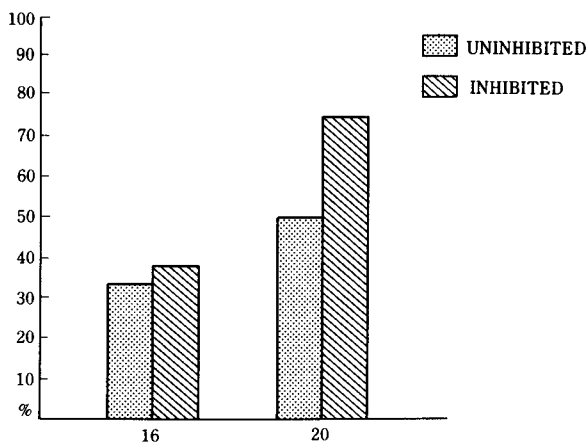


FIGURE 4 Proportion of self-recognizers by level of inhibition at 16- and 20-months



infants (5 out of 6) were "B" infants. That is, even in the sample reported here the close relationship of temperamental disposition to the classification of attachment can be seen, and this result is congruent with that of the other studies (see Miyake et al., 1983).

Figure 4 shows the proportion of infants classified as self-recognizers at 16- and 20-months by level of infant inhibition. While no difference in the proportion of self-recognizers can be seen between the inhibited and the uninhibited infants at 16-months (3 out of 8 and 2 out of 6, respectively), small difference can be observed at 20-months : 75.0% of the inhibited infants (6 out of 8) were self-recognizers at 20-months as compared to 50.0% of the uninhibited infants (3 out of 6). Although statistically no clear difference is found in the proportion of self-recognizers by level of infants inhibition , when considered together with the results of the relationship of level of infant inhibition to attachment, these results suggested that the inhibited infants were more likely to be early self-recognizers as opposed to the uninhibited infants.

### *DISCUSSION*

The most important finding in the second study is the fact that the inhibited infants at 7- and 11-months, who were more likely to be insecurely attached, were also more likely to exhibit early self-recognition at 20-months. That is, infant temperamental disposition such as inhibition was related to infant's attachment relationship with his mother, and to the infant's visual self-recognition as well. These results suggest that temperament may function as a mediator of the relationship between attachment and self-recognition. This notion is congruent with Brown's study which suggested that infants' characteristics at birth were related to the infants' awareness of themselves and their social environment, even though the study focused on the first few weeks of life (Brown, 1974).

### *CONCLUSION*

One of the present findings indicates that the infants' early relationship with their mother is related to later individual differences in the emergence of self-recognition. In particular, insecurely attached infants exhibited earlier self-recognition than securely attached infants. At least two possible explanations may account for the relationship between insecure attachment and earlier self-recognition. (1) Socially separated infants, like insecurely attached infants, tend to become more vigilant, and this tendency to be vigilant facilitates the differentiation between the self and the others. The differentiation leads to self-recognition. (2) Temperamental disposition such as inhibition, which is closely related to vigilance, affects both infant's attachment relationship with his mother and self-recognition, because inhibited infants were shown to be both insecurely attached infants and early self-recognizers (study 2).

Thus considered, these two explanations are not contradictory to each other. The present studies suggest the possibility that temperamental disposition (vigilance) can function as a mediator between infant's social interaction with his mother and later development of self-recognition.

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執筆 者 紹 介 (掲載順)

三 宅 和 夫 (教授・附属乳幼児発達臨床センター長)

ジョセフ・キャンボス (教授・デンバー大学)

ジェローム・ケイガン (教授・ハーバード大学)

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中 野 茂 (大学院博士後期課程)

田 島 信 元 (助手・発達心理学講座)

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附属乳幼児発達臨床センター

〒060 札幌市北区北11条西7丁目

電話(011) 716-2111 内線3106