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ANALYSIS OF INFANT'S INHIBITED BEHAVIOR SHOWN IN PEER INTERACTION AT 23 MONTHS*

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Infant's inhibited behavior was examined in relation to consistency of behavior style. At 23 months, peer interaction was observed for 15 minutes in a laboratory. Twenty infants (10 males and 10 females) were rated as "inhibited" or "uninhibited" according to their behavior during the first 5 minutes of the peer-play session. Significant individual differences and sex differences concerning inhibition were found. The inhibited infants looked at the peer, approached mother, and touched mother significantly more often than the uninhibited. Female infants interacted with each other significantly more frequently than males.

In order to examine consistency of infant inhibition, other longitudinal data obtained from 12 to 36 months of age were also analyzed concerning the dimension of inhibition. Only one inhibition measure was related to the inhibition measures from the 23 month peer play. However the proportion with a higher inhibited tendency support the hypothesis on consistency of inhibition to a certain extent.

Key words : infant's inhibited behavior, consistency of inhibition, peer interaction

The purpose of this paper is to examine whether it is valid to say that an infant's inhibited behavior shown in peer interaction in a laboratory at 23 months of age is a consistent behavior style or temperamental characteristic. Individual differences in "inhibited" or "uninhibited" behavior may be maximized in peer play in a laboratory setting. That is to say, some infants might not be fearful of a new situation or an unfamiliar person, so they could behave naturally or socially, while others might feel restless in the same situation and thus show more inhibition. According to Kagan, Kearsley & Zelazo (1978), "the unfamiliar child and not the mother was the primary incentive for the child's inhibition...the uncertainty generated by the unfamiliarity of a

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playroom or a laboratory episode appears to decrease significantly after twenty months of age.”¹

It is beyond the scope of this paper to refer to a theoretical discussion on the social, emotional and cognitive growth function across age with regard to inhibition. However it is necessary here to point out the functional role of inhibition. Infant inhibition can work as one of the coping behaviors that regulate or control social interaction.

The problem to be dealt with in this paper is how infants expressed their inhibition in a peer play situation and whether the same aspects of such inhibited behavior were shown in different contexts at different points of time. For this purpose longitudinal data of the same subjects obtained at 12 months (Ainsworth Strange Situation), at 16 months (Behavioral Style Questionnaire which is a Japanese translation of the Carey's Infant Temperament Questionnaire by Junichi Shoji), at 23 months (free-play in a laboratory), and 36 months (a meeting for promoting mutual friendships for the participants of our project) were analyzed with regard to the dimension of inhibition.

METHOD

Subjects : The sample was composed of 16 infants and their mothers who participated from the neonatal period and 4 new participants from 11 or 12 months of age. The infants are 10 males and 10 females.

Procedure : At 23 months, same-sex and same-aged unfamiliar infants were made into pairs. Two infants with their mothers entered a play room (3.8m×5.9m). Mothers were instructed to sit in a chair and not to interact with the children unless necessary during the 15 minute session.

There were several kinds of toys such as cars, an airplane, a stuffed animal, blocks, cups, spoons, and so on, in the middle of the room.

(1) Behavioral Codings

Two observers next to the play room independently checked each infant's behavior through a one way mirror every 10 seconds using a stop watch. The major behaviors coded from the live codings were, looking at the peer, looking at mother, approaching the peer, approaching mother, touching mother, and initiating peer interaction (by smiling, vocalizing, showing or presenting toys, and taking toys). We defined approaching by infant as the purpose of getting in touch with or interacting with the peer or mother. If an infant stayed by the mother within reach, this was coded as approaching. If the peer was accidentally near him/her on the way to exploring the room, it was not approaching. Inter-observer reliabilities of these categories averaged 0.93 based on 10% of the observations.

(2) Transcription of the video tapes

Besides these live codings, we transcribed the video tapes of the peer-play sessions in order to analyze infants' play activity. As illustrated by Figure 1, data on the latency from the beginning of the session to the first touching of the toys and to

1. Cf. *Infancy* p. 245

		Date 8/21	Name T. N.
time		infant's play activity	
1 min.		Walked to the toys, touch the toy	
	10sec.	looking at the peer with the toy	
	20sec.	Riding a car, moved a little	
<hr/>			
2 min.		Show a ball to the peer	
	30sec.		

FIGURE 1 Illustration of the transcription

the first initiation of peer interaction were obtained from these transcriptions.

(3) Assessment of stability

Infant behavior during the first 5 minutes was rated separately from the final 10 minutes in order to examine the stability of behavior over the session.

The rationale for dividing the session at 5 minutes was as follows (1) we adopted the same method as Coll, Kagan & Reznick (1983) who divided the peer-play session into three parts, (2) we believe that we can measure inhibition by the infant's behavior at an earlier part of the session. In addition to these reasons, mean latency to initiate interaction was 5.1 minutes.

(4) Rating of inhibition

Table 1 presents the criteria for rating infant inhibition. They are, separate from mother, approach peer actively, initiate peer interaction by smiling, vocalizing, showing or presenting toys and taking toys, and respond to peer by smiling, vocalizing, receiving toys or presenting another toys, and taking the peer's toys, and general activity level. Whether or not an infant moved around or explored the play-room, and whether or not an infant looked happy when manipulating toys were used for deciding general activity level. The reason why we used these criteria was that we want to assess infants' behavioral style on the whole, rather than their discrete behavior.

Two raters (one of them were different from the live coders) assessed infant behavior by watching video tapes. Interrater reliability was 0.85 based on 10% of the observations. After the coding, using a median split procedure, the infants who scored 4 or 5 were classified as "inhibited", and those who scored 3, 2, or 1 were classified as "uninhibited". Ten infants (6 females and 4 males) were inhibited and 10 infants (4 females and 6 males) were uninhibited.

Each of the above measures were coded and derived by a different group of observers. Thus, the raters of inhibition, for example, were unaware of the infant's scores on the other ratings. Thus, each of the scores were rated independently, and

TABLE 1

Criteria for rating inhibition

Rating score	Separate from mother	Approach peer actively	Initiate peer interaction	Respond to peer	Active or Playful
1	Yes	Yes	Yes	Yes	Yes
2	Yes	Sometimes Yes	Sometimes Yes	Yes	Yes
3	Yes	No	No	Yes	Sometimes Yes
4	Sometimes Yes	No	No	Sometimes Yes	No
5	No	No	No	No	No

the observers were blind to the other assessments on the same infants.

RESULTS

1. Assessment of stability of inhibition

As shown in Table 2, correlations between the infant's behavior during the first 5 minutes, and his/her behavior during the last 10 minutes, were computed in order to examine stabilities in the infants' behavior. The measure used was the frequency of 10 second units. The mean frequencies per one minute in the first 5 minutes and in the last 10 minutes were shown in Table 2. These results indicate that the infants were fairly consistent, except for touching mother, across the 15 minutes observation. The mean frequencies for touching mother in each part were 0.65 vs. 0.69 per 1 minute. As a result of this, data in subsequent analysis will be pooled across the whole session.

2. Individual differences in inhibition

The latency to manipulate toys from the beginning of the session was significantly different between inhibited and uninhibited infants. The mean latency was 30.4 seconds for the inhibited infants and 1.9 seconds for the uninhibited infants ($\chi^2=3.516$, $df=1$, $p<0.1$). With regard to the latency to initiate interaction, no significant differences were found (means were 6.6 minutes for the inhibited vs. 5.1 minutes for the uninhibited infants, $\chi^2=0.73$, $df=1$).

TABLE 2

Person correlations between the frequencies of infant behavior during the first 5 minutes and during the last 10 minutes and mean frequencies per one minute in each part

Categories	Correlations	Mean frequencies (per 1 minute)	
		First 5 min.	Last 10 min.
Looking at peer	0.4004 ^s	2.68	2.09
Approaching peer	0.3768 ^s	0.59	1.01
Looking at mother	0.5280*	0.75	0.57
Approaching mother	0.6663**	1.95	2.89
Touching mother	0.3251	0.65	0.69
Initiating peer interaction	0.5784**	0.15	0.35

** $p<0.01$, * $p<0.05$, s $p<0.1$

Table 3 presents means of the frequency of 10 second units for the infant's coded behaviors during the whole 15 minutes broken down according to the classification of inhibition. As shown in the Table, those who were rated as "inhibited" showed a significantly higher tendency to look at the peer, approach mother, and touch mother through the whole 15 minutes. No other differences were found.

TABLE 3

Means of frequency for infant categories and t-test by classification of inhibition

Mean Score of rating Categories	Inhibited 4.1 (N=10)		Uninhibited 2.3 (N=10)		t-test	
	M	SD	M	SD	t	p
Looking at peer	41.9	14.2	24.5	18.0	2.277	0.05
Approaching peer	9.6	7.0	16.2	11.4	-1.473	n.s.
Looking at mother	9.0	8.7	9.8	5.7	0.229	n.s.
Approaching mother	52.0	24.2	29.2	18.6	2.617	0.02
Touching mother	17.5	10.8	2.9	6.5	3.452	0.005
Initiating peer interaction	3.0	2.6	5.5	6.0	0.268	n.s.

3. Sex differences in inhibition

There were no significant differences between females and males concerning the latency to manipulate toys and the latency to initiate interaction.

Table 4-(a) presents means of frequency for infant's coded behaviors classified by sex differences. Significant sex differences were found with regard to approaching the peer and initiating peer interaction. According to Table 4-(b), even "uninhibited" males approached the peer and initiated peer interaction significantly less often than "uninhibited" females ($U=0.5$, $n_1=4$, $n_2=6$, $p<0.01$, $U=5$, $n_1=4$, $n_2=6$, $p<0.1$, respectively). Moreover the means of "uninhibited" males for approaching the peer and initiating peer interaction were lower than those of "inhibited" females, although the differences were not significant ($U=17.5$, $n_1=6$, $n_2=6$, $U=4$, $n_1=5$, $n_2=2$, respectively).

4. Examination of other longitudinal data on inhibition

In order to examine the appropriateness of the dichotomy of infants by using the result from the 23 month peer-play session, retrospective and prospective data were also analyzed concerning the dimension of inhibition.

(i) Data from 12 month Ainsworth Strange Situation

Infant behavior to the stranger in episode 3 was assessed by two raters using the scoring system for interactive behaviors.² Intensity to avoid a female stranger and frequency of distance interaction with her were used for inhibition measures. The scoring system for interactive behavior consists of 7 point rating scales. Point 7 is given to the highest avoidance or distance interaction, and point 1 is to the lowest. Interrater reliabilities were 92.9% for avoidance and 94.0% for distance interaction based on the assessments of all the subjects.

2. Cf. *Patterns of Attachment*, Appendix III

TABLE 4-(a)

Means of frequency for infant categories and t-test by sex differences

Mean Score of rating Categories	Male		Female		t-test	
	3.2 (N=10)		3.1 (N=10)		t	p
	M	SD	M	SD		
Looking at peer	30.3	20.7	23.2	16.2	0.807	n.s.
Approaching peer	8.6	6.3	17.2	11.1	2.012	0.1
Looking at mother	10.0	7.8	8.8	6.8	0.346	n.s.
Approaching mother	36.2	28.8	41.0	22.1	0.394	n.s.
Touching mother	9.1	11.0	11.3	12.4	0.396	n.s.
Initiating peer interaction	3.1	2.9	6.6	4.8	1.880	0.1

TABLE 4-(b)

Means of frequency for infant categories and U-test by classification of inhibition and sex

Categories	Inhibited			Uninhibited		
	Male	Female	U-test	Male	Female	U-test
	N=4	N=6		N=6	N=4	
Looking at peer	39.5	43.5	n.s.	25.3	22.3	n.s.
Approaching peer	8.0	10.7	n.s.	9.0	27.0	p<0.01
Looking at mother	7.8	10.7	n.s.	18.5	6.2	p<0.1
Approaching mother	51.8	52.2	n.s.	25.8	24.3	n.s.
Touching mother	16.0	18.5	n.s.	4.5	0.5	n.s.
Initiating peer interaction	1.0	4.0	p<0.1	2.3	10.5	p<0.1

(ii) Data from 16 months of age

Inhibition measures concerning withdrawal-approach dimensions obtained from a Japanese version of Carey's Infant Temperament Questionnaire by Shoji were used. Six items used were, an infant clings mother or turns away when he/she meets an unfamiliar infant, an infant rejects caress by an unfamiliar person at first, an infant feels restless for a few minutes in an unfamiliar situation, an infant at first rejects an unfamiliar person even in his/her own home, an infant rejects a doctor, an infant doesn't look happy when he/she goes to an unfamiliar place for the first time. These were evaluated by mother by a possible score of 1-6 points. Total lowest withdrawal was 6 points and total highest withdrawal was 36 points.

(iii) Data from 23 month free-play session

Infant behavior during a 10 minutes free-play session was evaluated concerning adaptability and playfulness by a possible score of 1-5 points. At the most, there were only one point discrepancies between the two raters, and in this case, the average score of the two was used.

The criteria used for rating infant adaptability were (1) He/she stayed by mother without engaging in toy play during 10 minutes, (2) He/she began to play with a toy at the end of the session, (3) He/she played at the latter half of the 10 minute session,

(4) He/she began to play after a few minutes, (5) He/she immediately began to play and continued to play during the whole 10 minutes session. With regard to playfulness frequency and duration of smiling, vocalizing, toy manipulation, were evaluated by the criteria of never (1), seldom (2), sometimes (3), often (4), and always (5).

(iv) Data from 23 month questionnaire on peer experience

At 23 months of age, a questionnaire on the infant's social network and peer experience was administered. According to the results of the questionnaire, the inhibited group had 3.4 daily peer contacts (range ; 0-7), while the uninhibited group had 5.6 (range ; 0-13).

(v) Data from 36 month Cohort I group meeting

At 36 months, a cohort I group meeting for promoting mutual friendship among the participants was held in a nursery play room. Twelve children and their mothers attended it. Children's behavior was videotaped and evaluated using the same inhibition criteria as shown in Table 1. Based on the 23 month rating, 5 inhibited infants and 7 uninhibited were present at 36 months. Four out of 5 children rated as inhibited at 23 months were also rated as inhibited at the 36 month group meeting, but only 1 out of 7 uninhibited children were rated as inhibited at 36 months ($\chi^2=2.831$, $df=1$, $p<0.1$).

5. About the relationship between the classification of inhibition at the 23 month peer-play session and other inhibition measures from the longitudinal data

Table 5 represents means for infant's composite measures for inhibition from 12 to 36 months of age using the 23 month peer-play classification.

If higher avoidance of a female stranger and lower distance interaction with her can be regarded as an inhibited tendency, the results at 12 months support the 23 month classification of inhibition, although the difference was not significant ($\chi^2=1.515$, $df=1$, $p<0.25$ for avoidance and $\chi^2=1.639$, $df=1$, $p<0.25$ for distance interaction).

At 16 months, higher scores concerning withdrawal may indicate an inhibited tendency. It was not significantly different ($\chi^2=2.533$, $df=1$, $p<0.25$).

At the 23 month free-play session, higher adaptability and playfulness was interpreted as an uninhibited tendency. With regard to adaptability, the difference was significant ($\chi^2=2.99$, $df=1$, $p<0.1$), but not for playfulness ($\chi^2=2.63$, $df=1$, $p<0.25$).

TABLE 5

Means for infant composite measures for inhibition from other longitudinal data using 23 month peer-play classification

peer-play classification		12 Months (N=17)		16 Months (N=19)	23 Months (N=19)		36 Months (N=12)
		Avoid S.	Interact with S.	Withdrawal	Adaptability	Playfulness	Inhibition
Inhibited	M	3.4	3.8	22.2	3.1	2.75	4.0
	(SD)	(1.81)	(1.37)	(6.3)	(1.35)	(0.89)	(1.22)
Uninhibited	M	2.1	4.5	17.2	4.2	3.6	2.9
	(SD)	(1.86)	(0.89)	(7.3)	(0.67)	(0.60)	(0.69)

6. Longitudinal consistency of inhibition

Inhibition measures used were avoidance of the stranger, distance interaction with the stranger, withdrawal scores from a Temperamental Questionnaire, adaptability and playfulness in a free-play session and rating of inhibition in a group meeting. Number of infants who scored higher than the mean on these 6 inhibition measures were classified according to the 23 month peer-play inhibition classification (Table 6).

From the results shown in Table 6, we can see that eighty percent of inhibited infants at 23 months showed a higher inhibited tendency than uninhibited infants at 23 months. In contrast, those who were rated as uninhibited at 23 months showed a higher uninhibited tendency than those who were rated as inhibited at 23 months ($\chi^2=10.45$, $df=2$, $p<0.01$).

TABLE 6

Number of infants whose scores for 6 composite measures for inhibition from 12 to 36 months were higher or lower than each mean

Number of scores higher than each mean of composite measures for inhibition	Inhibited (N=10)	Uninhibited (N=10)
More than 5 out of 6 inhibition components	5	0
4 or 3	3	1
less than 3	2	9

DISCUSSION

The purpose of this paper was to examine (1) how infants expressed their inhibition in a peer-play session, and (2) whether the same aspects of such inhibited behavior were shown in different contexts at different points of time. With regard to (1), the results suggest that infant inhibition can be measured by behaviors such as looking at the peer, approaching mother, and touching mother (that is, not playing with toys). Concerning (2), only one inhibition measure from 23 month free-play session was related to the measures from the 23 month peer play. However the proportion with a higher inhibited tendency support the hypothesis on consistency of inhibition to a certain extent, although based on only 20 subjects.

Individual differences and sex differences were found during peer interaction. If an infant looked at the peer while staying by the mother or touching mother, he/she may be very inhibited. Even uninhibited infants did not necessarily initiate interaction, and looked at the peer very often, suggesting that inhibition expressed by looking at the peer may have two different functions. That is to say, vigilance vs. fear. If an infant's looking at the peer represents his/her vigilance, he/she may prepare to act next, while if it represents fear, he/she may not act positively.

Both the results of pair differences concerning the frequency of social interaction, and the results from the 23 month questionnaire on infant's daily peer experience, also present the problem of how social experience influences infant temperamental characteristics, or how temperamental characteristics influences infant social experi-

ence. We need to identify both developmental changes in temperament and the sources of those changes.

According to Rothbart and Derryberry (1981), temperament at time 1 will delimit the range of possible changes by time 2 as far as infant reactivity and self-regulation are concerned. It seems that it is also true for inhibition. In this study, infants who avoided a stranger strongly and interacted infrequently with her in Ainsworth Strange Situation at 12 months tended to get higher scores for withdrawal at 16 months, to gain lower scores for adaptability in a 23 month free-play session and to show higher inhibition in a 23 month peer-play session. On the contrary, infants who showed lower tendency to avoid a stranger and who initiated distance interaction with her during the 12 month Ainsworth Stranger Situation showed a lower inhibition tendency afterwards. This suggests that with regard to inhibition, there is a strong possibility that it will maintain for a certain period of time.

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