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Author(s)	SATOH, Kimiharu; MIYAKE, Kazuo
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WHAT ASPECTS OF PARENTAL BEHAVIOR LEAD  
TO THE CHILD'S POSITIVE COGNITIVE DEVELOPMENT  
DURING YEARS PRIOR TO AND SOON  
AFTER SCHOOL ENTRANCE ?

Kimiharu Satoh  
*Hokkaido University of Education*  
Kazuo Miyake  
*Hokkaido University*

INTRODUCTION

Years prior to and soon after school entrance are a critical period for child development. During this period, many of the fundamental skills of life are mastered and many cognitive and social skills are achieved.

These developmental changes of the child bring about changes in interpersonal relationship. For example, great increase in interaction with peers is observed after entering nursery school. Also there is a broadening of experience in relation to the physical environment.

In order to specify the environmental factors that facilitate development and the optimal educational conditions for children of this age, it is necessary first to get a clear picture of children in their natural habitat.

Our first attempt in 1976 was a comprehensive longitudinal research project that focused on aspects of the child's intellectual development and parental behavioral characteristics. Some of the results have been reported in Miyake et al. (1978 b) and Seki et al. (1978).

The two important viewpoints concerning the nature of the parent-child relationship shared by the authors of this paper, by Miyake et al. (1978) (longitudinal study) and by Tajima et al. (1978) (cross-cultural study), are the following : (1). The parent-child relationship should not be regarded as a uni-directional process from parent to child, but as a reciprocal interaction process between parent and child. That is, we should attempt to grasp this relationship from the aspect of the child's influence on the parents as well as from the angle of parental effects on the child. (2). We should assess the actual and particular interaction processes in a setting that is as natural as possible in order to know how the parent's behavior is related to the child's behavior development. In addition,

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This study was conducted as a part of the research project : "An eco-psychological study on parent-child relationship and child development." The project received a research grant from the Ministry of Education for the years 1976 and 1977.

The following are individuals who have also participated in the project : Nobumoto Tajima, Michiko Seki, Tatsuo Ujiie (Hokkaido University), Kunio Wakai (Kobe University), Mamoru Gotoh, and Hiroshi Usui (Hokkaido University of Education).

Computation was run at the Hokkaido University Computer Center, using SPSS. The authors wish to thank Shing-jen Chen for his editing and proofreading. Requests for reprints should be sent to Kimiharu Satoh, Department of Psychology, Hokkaido University of Education, 2, Midorigaoka, Iwamizawa-shi, Hokkaido, Japan, 068.

recent studies on cognitive socialization have emphasized the effects of verbal and non-verbal behavior of the mother during interaction on the child's cognitive development (e. g., Hess et al., 1965 ; Bee et al., 1969 ; Brophy, 1970 ; Saxe et al., 1971).

This paper will discuss some of the results of a study, entitled "An eco-psychological study on parent-child relationship and child development" (1976-1979). The following points will be emphasized.

(1). *The importance of assessing triadic parent-child interaction.*

Most studies concerning parent-child interaction have focused mainly on mother-child interaction, while the father's role has been discussed by using data obtained entirely from interviewing mother and child, or by showing the negative effects of the father's absence. Furthermore, very few studies have looked into father-child interaction (Radin, 1976).

Moreover, there is some evidence to suggest that depending on whether the other is present or not, parents often behave in different ways toward the same child (Radin, 1976). Thus, the parent-child relationship should be conceived as a complex structure with multi-strata in which the mother, father, and child work directly and indirectly on each other in a fine interactional network.

Therefore, in this project, two dyadic interactions of father-child and mother-child, and one triadic interaction of father-mother-child were observed.

(2). *The importance of observing parent-child interaction in different situations.*

Many psychologists tend to examine parent-child relationship by assessing an interaction situation in one session. It is found, however, parental behavior in parent-child interaction vary according to context. Hence, it is necessary to observe parent-child interaction in different settings in order to have a complete picture.

In addition, we think it necessary to observe "natural" parent-child interaction, that is, their behavior in everyday life.

Therefore, in this study, "natural" interaction was observed in the home environment, and both dyadic and triadic interactions were assessed in two controlled laboratory situations (Task and Free-play session).

(3). *The importance of observing and testing child behavior and cognitive abilities longitudinally and comprehensively.*

In order to obtain a more realistic picture of child behavior and intellectual development, children followed from nursery through the second year of primary school, were given many kinds of tasks to measure their cognitive abilities.

Our subjects were enrolled in our experimental nursery school, and this permitted us to collect various background data such as the child's life history, his general ability and achievement.

After entering primary school, behavior ratings by teacher, interviews with teacher were obtained, and several cognitive tests were implemented.

The research to be reported is a part of the project described above. In the present paper, the following data will be analyzed : (1). Rating data concerning parental and child behavior in dyadic interactions. (2). Teacher's ratings of child behavior in nursery and primary school, and the child's cognitive measures.

The following questions are raised in the paper.

(1). What relationship can be seen between parental behavior to the child and the child reaction in dyadic interaction, as well as between these parental behaviors and the child's performance measures afterward? It is hoped that an examination of our data will clarify the characteristics of parental behavior that promotes the child's cognitive development.

(2). What are the differences between the mother's and father's behavior in affecting the child's intellectual development?

(3). What are the differences between Task and Free-play sessions in the correlational patterns of parental behaviors and the child's cognitive measures?

## METHOD

### I. Subjects

The subjects were 25 children in our experimental nursery school and their parents. They lived in the vicinity of the University. Among the 25 families, 20 were nuclear families. Twenty-three were classified as middle class, and the remaining two, lower class.

### II. Procedures

#### 1. Data collection for Interaction Session

(1) The parent-child interactions were observed in the following two situations i) Home environment and, ii) Controlled laboratory. For data concerning home environment, see Miyake et al. (1978 b).

#### (2) Timing

In 1976, eleven dyadic (mother-child, father-child) interaction were video-taped, and in the following year, interactions of fourteen dyadic were recorded. The children included in the 1976 recording schedule were 6.2 years old (range: 5.9-6.8) and the 14 children observed in 1977 had a average age of 6.17 years old (range: 5.8-6.6).

Two dyadic interaction sessions consisted of two parts: i) Task session, ii) Free-play session (See Miyake et al. *ibid*).

#### (3) Rating Method

Immediately after watching the video-tape, two female researchers independently rated the behaviors of the participants in the interaction situation. All ratings were made by using a seven-point scale.

#### A) Parent behavior:

Tendency of parental behaviors was assessed in the following twelve items.

- a) to use pressure in promoting child's achievement (Press)
- b) to give help (Help)
- c) to praise child (Praise)
- d) to criticize child (Critic)
- e) to be tense (Tense)
- f) to be sensitive to child's psychological states (Sensitive)
- g) to involve in child's task (Involve)
- h) to provide much information (Much-Inform.)
- i) to be principle-oriented in supplying information (Principle-Inform.)
- j) to be directive in child's task (Directive)
- k) to be collaborative in child's task (Collaborate)
- l) to be initiative in interaction with child (Initiative)

## B) Child behavior :

- a) to be reflective (Reflect)
- b) to be persistent (Persist)
- c) to be responsive to parent's behavior (Response)
- d) to be positive in approaching task (Approach)
- e) to be self-confident (Confident)
- f) to be independent from parent (Independ)
- g) to be tense (Tension)
- h) to be original (Original)
- i) to show curiosity (Curiosity)
- j) to be self sufficient (Sufficient)

## 2. Child Performance Measures and Behavior Ratings

Since the subjects for this research were children enrolled in the older group of our experimental nursery school, various background information (child life history, family composition, income, the father's occupation, and other family conditions) has already been obtained.

In addition, child performance measures (C. P. M.) and the teacher's ratings of child behavior were also obtained to serve as more direct and comprehensive indices of the child's current levels of performance and attainments. The following measures and teacher ratings were obtained at four different intervals from the time the child was 4 years of age till when his was 7.

## (1) Child Performance Test

- a) Tanaka-Binet Intelligence Test (one of the Japanese versions of Stanford-Binet Test) [4.5, 5.5, 6.5] \*
- b) Number Conservation Test (derived from Piaget's work) [6.0]
- c) Matching Familiar Figures Test [6.5]
- d) Persistence Test (Reiss and Dyhdalo, 1975) [6.5]

Subjects were given problems 9 and 10 of the WAIS Block Design Test and asked to work on either one or both problems as long as he/she could possibly. The measure of persistence was the total amount of time spent on the puzzles. The test was terminated when any of the following occurred : i) The child decided to give up. ii) The child worked continuously and reached the 10 minutes limit.

- e) Locus of Control : Stanford Preschool Internal-External Scale (Mischel et al. 1974) [6.5]

Internal Score was used.

- f) Object Exploration Task [7.0]

Each child was brought into a playroom and told that he could play with whatever there were. The room (4×6m) contained 10 toys and objects judged to be novel to the child, such as : a small electric tester, a microscope, a typewriter, and the Etch-A-Sketch game set, etc. The child's exploratory behaviors were observed for twenty minutes through a one-way mirror. The whole session was

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\* The number in brackets indicates the children's mean age when the tests and ratings were performed.

also video-taped. One male observer gave a running narration of the child's behavior while a female researcher checked the behaviors by using a pre-categorized recording sheet.

The Object Exploration Scores were composed of three elements: i) Number of object manipulated (N. of object), ii) Total number of varieties of manipulative behaviors (N. of manipulative varieties). iii) Number of manipulative activities the purpose of which was judged to be information gathering or data-eliciting concerning the structure or the application of the items (N. of purposive manipulations).

g) Level of Aspiration Task [7.0]

Child was asked to trace within two minutes a narrow curved path by using A Left-Right-Hand Coordination Device (Etch-A-Sketch Game). Level of Aspiration was measured by Goal Discrepancy Score (GD Score) and Fluctuation value (F-value).

(2) Teacher Ratings of Child Behaviors

A) Behavior ratings based on observation in nursery school [5.5]

The nursery school teacher and one other staff member who knew the children well rated each child on a scale consisting of 19 items.

B) Behavior ratings by primary school teacher [6.5]

Four months after the child entered primary school, information about child behavior and adjustment to school was provided by the teacher by a 21 item rating schedule.

Both ratings were made by using a five-point scale, and they consisted of nearly identical items. Tendency of the child's behaviors was assessed in the following 21(19) items.

- a) to be positive in approaching task in nursery or at primary school (Approach)
- b) to be persistent (Persist)
- c) to have long attention span (Attention)
- d) to be reflective (Reflective)
- e) to show specific curiosity (Specific Curious)
- f) to show diversive curiosity (Diversive Curious)
- g) to attempt to coordinate information (Coordinate Inform.)  
(for primary school subjects only)
- h) to have a desire to do well in various daily tasks (Motivated in task)
- i) to have a desire to do well in physical activities (Motivated in sport)
- j) to have a desire to do well in arts (Motivated in art)  
(for primary school subjects only)
- k) to have a desire to take initiative (Initiative)
- l) to be competitive (Competitive)
- m) to be original (Original)
- n) to be independent (Independ)
- o) to be assertive (Assertive)
- p) to be spontaneous (Spontaneous)
- q) to be sociable (Sociable)

- r) to take leadership in group activities (Leadership)
- s) to be conscientious (Conscience)
- t) to be altruistic (Altruistic)
- u) to adapt easily (Adapt)

### 3. Formulation of Composite Variables

The following composite variables were derived from parental behavior ratings and the teacher's ratings of the child. They were selected and recombined by using the internal intercorrelation coefficients and the results of factor-analyses.

#### (1) Mother's Composite Variables in Task Session

- a) SENSITIVITY = Praise + Sensitive

This composite was used to estimate the degree of the parent's sensitivity to the child's behaviors and motivational level.

- b) INTERFERENCE (INTERFER) = Press + Critic

This was used as an estimate of the degree to which parent interfer with the child's activity.

- c) INVOLVEMENT (INVOLVE) = Press + Involve

To estimate the degree of the parent's involvement in the child's task.

#### (2) Mother's Composite Variables in Free-play Session (except the last one, all variables below have the same components as in Task session)

- a) SENSITIVITY

- b) INTERFERENCE (INTERFER)

- c) INVOLVEMENT (INVOLVE)

- d) DIRECTIVENESS (DIRECT) = Press + Initiative

This composite was used to estimate the degree to which parent was directive in the child's Free-play.

#### (3) Father's Composite Variables in Task Session

- a) SENSITIVITY

- b) INTERFERENCE (INTERFER)

- c) INVOLVEMENT (INVOLVE) = Help + Much-inform. + Principle-inform.

#### (4) Father's Composite Variables in Free-play Session

- a) SENSITIVITY

- b) DIRECTIVENESS (DIRECT)

The intercorrelation coefficient between Press and Critic, the components of the composite INTERFERENCE, was too low (.13) that it was not used here.

#### (5) Composite Variables of Teacher Ratings in Nursery School

- a) N-PERSISTENCE = Reflective + Persist + Attention

- b) N-PROSOCIAL = Leadership + Adapt + Sociable

- c) N-MOTIVATION = Motivated in task + Motivated in sport + Initiative  
+ Competitive + Assertive

#### (6) Composite Variables of Teacher Ratings in Primary School

- a) P-PERSISTENCE = Persist + Attention

- b) P-PROSOCIAL = Leadership + Adapt + Sociable

- c) P-MOTIVATION = Motivated in sport + Initiative + Competitive  
+ Assertive

d) P-INQUISITIVE = Diverive Curious+Original

Items of nursery and primary school teacher's ratings not included in these components were also employed

## RESULTS

### 1. Relationship between parental behavior characteristics and child performance measures

The relationship between characteristics of parental behavior and the child's developmental outcome was examined by correlational analysis of the ratings of the mother's and father's behaviors in parent-child (P-C) interaction on the one hand, and the teacher's ratings of child behavior and child performance measures (C. P. M.) on the other.

(1) Analysis of correlations between ratings of parental behavior characteristics and the teacher's ratings of child behavior.

Table 1 shows partial correlations between the ratings of parental behavior in P-C interaction and the teacher's ratings of child behavior in primary school with the child's IQ score at five years of age partialled out.

IQ scores at the time of the observed interaction was controlled so as to assess and identify the effect of parental behavior toward child without the confounding effects of the child's ability.

TABLE 1

Partial Correlations of Parental Behavior in P-C Interaction and Teacher's Ratings of Child Behavior

	Teacher's Ratings of Child Behavior					
	P-PERSISTENCE	P-PROSOCIAL	P-MOTIVATION	P-INQUISITIVE	P-approach	P-spontaneous
Mother's B.h. in Task						
SENSITIVITY	.28 <sup>△</sup>	...	.33 <sup>△</sup>	...	...	...
INTERFER	-.32 <sup>△</sup>	-.55***	-.36*	-.39*	-.35*	...
INVOLVE	-.35*	-.54***	-.42*	-.44*	-.37*	...
Mother's B.h. in Free-play						
SENSITIVITY	...	.30 <sup>△</sup>	.26 <sup>△</sup>	.29 <sup>△</sup>	...	...
INTERFER	...	-.28 <sup>△</sup>	...	...	...	...
INVOLVE	...	-.32 <sup>△</sup>	...	-.30 <sup>△</sup>	...	...
DIRECT	...	-.27 <sup>△</sup>	...	...	...	...
Father's B.h. in Task						
SENSITIVITY	.31 <sup>△</sup>	.40*	.38*	.47**	...	.41*
INTERFER	-.31 <sup>△</sup>	...	...	...	...	...
INVOLVE	...	...	...	...	...	...
Father's B.h. in Free-play						
SENSITIVITY	.42*	...	...	...	...	...
DIRECT	...	...	...	...	...	...

<sup>△</sup>p < .10, \*p < .05, \*\*p < .01, \*\*\*p < .005.

Blanks indicate no significant correlations.

As shown in table 1, the parent's SENSITIVITY was positively correlated with the child's PERSISTENCE, MOTIVATION and INQUISITIVE, while the parent's INTERFER and INVOLVE were negatively correlated with those teacher ratings.

It should be noted that the correlational patterns between parental behavior characteristics and the primary teacher's ratings of child behavior show great difference between father and mother. That is, the child's positive and adaptive behavior characteristics in primary school were negatively correlated with the mother's INTERFER and have no correlation with the mother's SENSITIVITY, whereas those child's behavior characteristics were not correlated with the father's INTERFER. They positively correlated with the father's SENSITIVITY.

The difference of correlational patterns between fathers and mothers will be further examined by using C. P. M. data in the next section.

(2) *Analysis of correlations of parental behaviors and C. P. M.*

The second analysis concerning the association between the characteristics of parental behavior and the child's developmental outcome is to examine the correlations of parental behavior ratings in P-C interaction and C. P. M., the latter being considered to be more sensitive measures for the child's cognitive attainment. Correlations between the child's IQ score at four, five and six years old, and the parent's behavior ratings in two interaction sessions are shown in table 2.

TABLE 2

Correlations of Parental Behavior in P-C Interaction and C. P. M. (1)

Parental Behavior	IQ			Conservation <sup>†</sup>
	Age: 4	Age: 5	Age: 6	
Mother's B. h. in Task				
SENSITIVITY	.49**	.34*	...	...
INTERFER	...	...	...	...
INVOLVE	...	...	-.29 <sup>△</sup>	...
Mother's B. h. in Free-play				
SENSITIVITY	.49**	.30 <sup>△</sup>	...	...
INTERFER	-.30 <sup>△</sup>	...	...	...
INVOLVE	...	...	...	-.32 <sup>△</sup>
DIRECT	...	...	...	-.31 <sup>△</sup>
Father's B. h. in Task				
SENSITIVITY	.51**	.40*	...	...
INTERFER	-.28 <sup>△</sup>	-.33 <sup>△</sup>	...	...
INVOLVE	...	...	...	...
Father's B. h. in Free-play				
SENSITIVITY	.43*	.43*	...	...
DIRECT	...	-.42*	...	...

<sup>△</sup>p < .10, \*p < .05, \*\*p < .01 Blanks: no significant corr.

<sup>†</sup>Partial correlation with IQ at five partialled out.

IQ scores obtained on and prior to the year when P-C interaction was observed, that is, when child was five and four years old, were positively correlated with both the mother's and father's SENSITIVITY. These tendencies are similar to those found in the results of

the primary school teacher's ratings.

However, at the age of six, there is a sudden lack of correlation between the IQ scores of the children and the ratings of the parent's behavior characteristics.

Since an IQ score is not to be a measure of the child's overall intellectual ability, the following analysis of the relationship between the parent's behavior characteristics and C. P. M. was conducted in order to better understand the relationship of parental behavior and the 6-7 year-old child's cognitive achievement. Table 3 shows partial correlations between the parent's behavior ratings in P-C interaction and C. P. M. (with child's IQ score at five partialled out). As seen in table 3, the child's PERSISTENCE scores and R. T. on M. F. F. test were negatively correlated with the mother's INVOLVE. A similar result was also obtained by using the data of teacher ratings of child behavior (table 1). Especially R. T. on M. F. F. test is correlated positively with the father's SENSITIVITY, and has significant negative correlation with the father's INTERFER and INVOLVE.

Scores in Level of Aspiration Task also obtain significant correlations with parental behaviors. Both the father's and mother's INTERFER and INVOLVE are negatively correlated with the G-D score, and are positively correlated with the Fluctuation value. These results partly agree with the result obtained in the child's MOTIVATION, one of the composite variables of teacher ratings of the child's behavior. The results suggest that parental restrictiveness hinder the development of achievement motivation.

TABLE 3

Partial Correlations of Parental Behavior in P-C Interaction and C. P. M. (2)

Parental Behavior	Persistense	M. F. F.		Locus of Control	Level of Aspiration		Object Exploration Task	
		R. T.	Error		G-Dscore	F-value	N. of Objects	N. of M. V.†
Mother's B. h. in Task								
SENSITIVITY	...	...	...	...	.27 <sup>△</sup>	...	...	...
INTERFER	...	...	...	...	-.39*	.35*	...	...
INVOLVE	-.47*	-.35*	...	...	-.36*	.31 <sup>△</sup>	...	...
Mother's B. h. in Free-play								
SENSITIVITY	...	...	...	...	.38*	...	...	...
INTERFER	...	...	...	...	...	...	...	...
INVOLVE	...	...	...	...	...	...	-.32 <sup>△</sup>	...
DIRECT	-.28 <sup>△</sup>	...	...	...	...	...	-.43*	...
Father's B. h. in Task								
SENSITIVITY	...	.53***	-.27 <sup>△</sup>	...	...	-.34*	...	...
INTERFER	...	-.40*	...	...	-.57***	.42*	.31 <sup>△</sup>	.35*
INVOLVE	...	.35*	...	.32	...	...	...	...
Father's B. h. in Free-play								
SENSITIVITY	...	.54***	...	...	.34*	...	-.30 <sup>△</sup>	-.31 <sup>△</sup>
DIRECT	...	-.34*	...	...	...	...	.31 <sup>△</sup>	...

<sup>△</sup>p < .10, \*p < .05, \*\*p < .01, \*\*\*p < .005. Blanks indicate no significant correlations.

†Number of Manipulative Varieties. ††Number of Purposive Manipulations.

An interesting result concerning the relationships between parental behavior and C. P. M. was obtained in the Object Exploration task. As can be seen in table 3, the mother's DIRECT and INVOLVE were negatively correlated with the child's active exploration to the novel objects. On the contrary, this explorative behavior has a positive correlation with the father's INTERFER.

Tables 1,2,3 give the impression that in comparison to parental behavior in the Free-play session, parent behavior in the Task session tended to have a clearer relationship with C. P. M.

### *2. Relationship between parental behavior and child behavior in P-C interaction*

In previous section, the relationships between the parental behavior and the child's cognitive attainment were examined, but we were not able to observe a direct relationship between parental behavior and the child's cognitive performance. Moreover, there existed a time lapse of 2 years between the time when P-C interaction was observed and when C. P. M. was administered.

Therefore, we assume that some mediational variables or substeps exist. In this section, correlations between parent and child behavior in P-C interactions where more concrete interactional processes were analyzed. In section 3, the predictability of child behavior in P-C interaction for later cognitive performance will be assessed. Only by putting together the results from section 2 and 3 can one begin to understand the intervening variables between parental behavior and the child's cognitive performance one.

Table 4 shows partial correlations between the ratings of parental behavior characteristics and child behavior characteristics in P-C interaction with the child's IQ score at five partialled out. Parental SENSITIVITY had significant positive correlations with the child's Reflective, Response, Approach, and Curiosity. This suggests that in P-C interaction parental sensitive behavior, particular in response to the child's achievement efforts, facilitates the child's persistent and active approach to the task.

On one hand, the mother's INTERFER, INVOLVE, and DIRECT had significant negative correlations with those child positive behaviors. On the other hand, paternal restrictiveness and involvement in the child's task had no observable negative effects on the child's behavior in P-C interaction and primary school.

Table 5 shows that the child's behavior in Mother-Child interaction situation has a high positive correlation with the teacher's ratings of the child's behavior in nursery school. However, the child's behavior in Father-Child interaction situation has a low correlation. In other words, the observed child's behaviors in Mother-Child interaction are highly consistent with behaviors in ordinary everyday situation in nursery school.

### *3. Predictability of child's behavior in P-C interaction for C. P. M.*

Does child behavior in P-C interaction predict C. P. M. one or two years later?

If the child's Reflect, Persist, Approach, Curiosity and other behavior characteristics positively correlated with the parent's SENSITIVITY, also have significant positive correlations with C. P. M., it can be assumed that those behavior characteristics are the intervening variables between parental behavior and the child's cognitive performance.

TABLE 4

Partial Correlations of Parental Behavior and Child Behavior in P-C Interaction.

Parental Behavior	Child Behavior in Interaction									
	Reflect	Persist	Response	Approach	Confident	Independ	Tension	Original	Curiosity	Sufficient
Mother's B. h. in Task										
SENSITIVITY	.54***	.30 <sup>△</sup>	.63***	.28 <sup>△</sup>	.28 <sup>△</sup>	...	-.45*	—	.37*	.29 <sup>△</sup>
INTERFER	-.45*	-.43*	-.54***	-.56***	-.52**	...	.50**	—	-.36*	-.55***
INVOLVE	-.49**	-.53***	...	...	-.55***	-.42**	...	—	...	-.60***
Mother's B.h. in Free-play										
SENSITIVITY	...	.30 <sup>△</sup>	.41*	.44*	.31 <sup>△</sup>	...	-.45*	.40*	.43*	...
INTERFER	...	...	...	-.43*	...	...	.36*	-.27 <sup>△</sup>	...	...
INVOLVE	...	...	...	-.39*	-.28 <sup>△</sup>	...	.33 <sup>△</sup>	...	...	...
DIRECT	...	...	...	-.52**	-.36*	...	.33 <sup>△</sup>	-.39*	-.38*	...

Parental Behavior	Child Behavior in Interaction				
	Reflect	Persist	Response	Approach	Confident
Father's B. h. in Task					
SENSITIVITY	...	.29 <sup>△</sup>	...	...	...
INTERFER	...	...	...	...	.37*
INVOLVE	...	...	...	...	...
Father's B. h. in Free-play					
SENSITIVITY	.37*	.47**	.61***	.55***	...
DIRECT	...	...	...	-.33 <sup>△</sup>	-.34 <sup>△</sup>

<sup>△</sup>p < .10. \*p < .05. \*\*p < .01. \*\*\*p < .005.

Blanks indicate no significant correlations.

TABLE 5

Correlations of Child Behavior in P-C Interaction and Teacher's Ratings of Child Behavior in Nursery School

Teacher's Rating of Child Behavior in Nursery School	Child Behavior in Interaction										
	Mother-Child Interaction in Task					Mother-Child Interaction in Free-play					
	Reflect	Persist	Independ	Curious	Approach	Reflect	Persist	Independ	Original	Curious	Approach
	.65***	.72***	.48**	.28	.50***	.65***	.60***	.62***	.47**	.42**	.39*
	Father-Child Interaction in Task					Father-Child Interaction in Free-play					
Reflect	Persist	Approach	Reflect	Persist	Approach						
.53***	.20	.34*	.56***	.21	.24						

\*p < .05, \*\*p < .01., \*\*\*p < .005.

†Items were only used, corresponding to the items of the child's behavior ratings in P-C interaction.

Table 6 shows correlations between the child's behaviors in P-C interaction and C. P. M. The child's Reflect and Persist were positively correlated with PERSISTENCE scores, R. T. on M. F. F. test and IQ score at six. The same results were obtained in the

teacher's ratings of child behavior in primary school. That is, correlations of Reflective and Persistence were positively correlated with the teacher's ratings. However, Curiosity and Response, which were positively correlated with the parent's SENSITIVITY, had no significant correlations with C. P. M.

TABLE 6  
Correlations of Child Behavior in P-C Interaction and C. P. M.

Child Behavior in P-C Interaction	IQ(Age: 6) Conservation Persistence			M. F. F.		Object Exploration task		
				R. T.	Error	N. of Objects	N. of M.V.†	N. of P.M.††
M-C Interaction in Task								
Reflect	.53***	.34*	...	.37*	-.44*	...	...	...
Persist	.48**	.37*	.47**	...	...	...	...	...
Response	...	...	...	...	...	...	...	...
Approach	...	...	...	...	...	...	...	.42*
Confident	...	.38*	.49**	...	...	...	.34*	.39*
Independ	.50**	.35*	.55***	...	...	...	.34*	.52***
Tension	...	...	...	...	...	...	...	...
Curiosity	...	...	...	...	...	...	...	...
Sufficiency	.43*	.34*	.42*	...	...	...	...	.40*
M-C Interaction in Free-play								
Reflect	.51**	...	...	...	-.43*	...	...	...
Persist	.36*	...	.44*	...	...	...	...	...
Response	...	...	...	...	...	-.49**	...	...
Approach	...	...	...	...	...	...	...	.37*
Confident	...	...	.37*	...	...	...	.35*	.54***
Independ	.34*	.50***	.52***	...	...	.35*	.39*	.41*
Tension	...	...	...	...	...	...	...	...
Original	...	...	...	...	...	.46**	.43*	.42*
Curiosity	...	...	...	...	...	...	...	...
Sufficiency	...	...	...	...	...	...	...	.40*
F-C Interaction in Task								
Reflect	...	...	...	.35*	-.51***	-.38*	...	...
Persist	...	...	...	...	...	...	...	...
Response	...	...	...	...	...	...	...	...
Approach	...	...	-.44*	...	...	...	...	...
Confident	...	...	...	...	...	...	...	.39*
F-C Interaction in Free-play								
Reflect	.40*	...	...	...	-.44*	...	...	...
Persist	...	-.37*	...	...	...	...	...	...
Response	.38*	...	...	.39*	-.50**	...	...	...
Approach	...	...	...	...	...	...	...	...
Confident	...	...	...	...	.37*	...	...	.37*

\*p < .05, \*\*p < .01, \*\*\*p < .005. Blanks: no significant corr.

†: Number of Manipulative Varieties, ††: Number of Purposive Manipulations.

As seen in table 6, the child's Confident and Independ, which were positively correlated with almost all C. P. M. except M. F. F. test, were not correlated with parental SENSITIVITY, but had a negative correlation with mother's INTERFER, INVOLVE and DIRECT.

These results can be interpreted as follows.

(1). A child Reflectivity and Persistence are one of the intervening variables between parental SENSITIVITY and the child's cognitive performance. Paternal and maternal SENSITIVITY enhance the child's reflective and persistent behavior, which in turn further facilitate the child's intellectual ability as reflected in IQ test and Conservation test.

(2). Children who tended to be confident and independent of the mother have shown active exploration toward novel objects, as well as high intelligence. These characteristics of the children cannot be expected from the parent who has a tendency to press or direct the child to do the task.

Paternal INTERFER, on the other hand, fostered the child's confidence which further facilitates object exploration.

## DISCUSSION

### 1. Effects of parental behaviors on child's cognitive development

One of the main purposes of this study was to clarify the effects of parental behavior characteristics on the child's cognitive development.

The first result of this study was that, parental sensitivity to the child's behavior positively affects the child's cognitive development, whereas parental restrictiveness and directiveness have negative effects upon the cognitive growth of the child.

The second finding was that some of the child's behavior characteristics (i. e. reflectivity, persistence, confidence, and independence from the mother) act as intervening variables between parental behavior and the child's cognitive attainment. Figure 1 is a

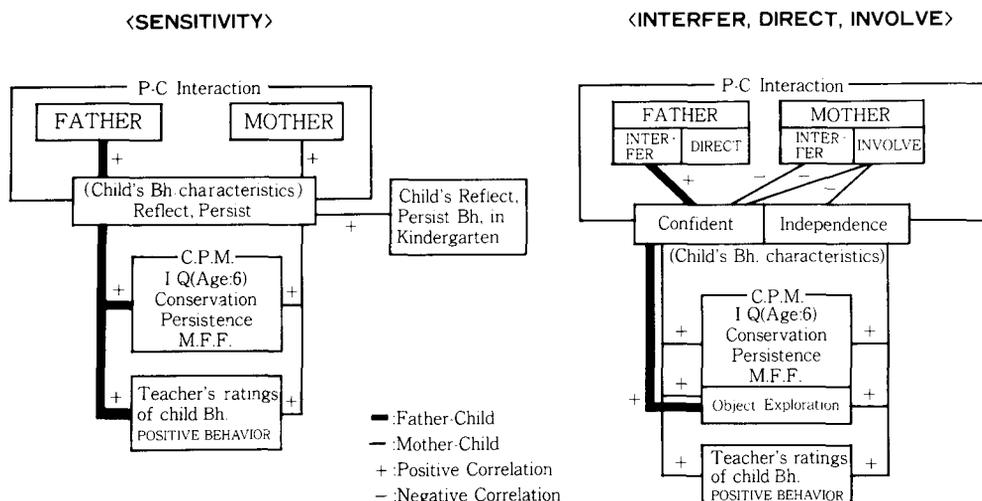


FIGURE 1 Schematic representation of relationships of parental behavior, child behavior, and C.P.M.

schematic representation of these relationships. It shows that both paternal and maternal SENSITIVITY enhanced the child's reflective and persistent behavior (as observed in P-C interaction), and fostered cognitive functioning (as assessed by C. P. M.). The mother's INTERFER, DIRECT, and INVOLVE, however, hindered the child's confidence and independence from the mother, which further hindered the intellectual development. Paternal INTERFER, on the other hand, facilitated the child's confidence and facilitated the activity of object exploration.

In our longitudinal study (Miyake et al., 1978 a), it was found that a sensitive/restrictive maternal approach resulted in the child's active/passive approach to the task in the interaction situation. In another study, it was also found that the mother's SENSITIVITY positively affected the child's cognitive functioning (Tajima et al., 1978).

The present study has revealed the nature of the relationship between parental behavior and the child's cognitive functioning through the clarification of the intervening processes. It was shown that parental behavior exerted its influence on the child's cognitive development through the mediating variables of the child's behavior characteristics.

In the present study, characteristics of parental behavior are treated as antecedent variables which affect the child's cognitive development, and the data was correlationally analyzed. However, it is not tenable to determine causal relationship between parental and child variables. The clarification of cause-effect relationships must await future research. The finding of our longitudinal study by using cross-lagged panel correlational technique suggests that the bi-directional flow of influences between parent and child becomes more and more apparent at five or six years of age (Miyake et al., 1979).

## 2. *Differences between paternal and maternal behaviors in affecting child's intellectual development*

Another purpose of the present study was to identify similarities or differences between paternal and maternal behaviors in influencing the child's cognitive development. Both the father and mother's SENSITIVITY lead to the child's active approach in P-C interaction as well as in C. P. M. later on.

However, there are some differences between paternal and maternal behaviors which affect the child's behavior in an interaction situation. The mother's INTERFER, INVOLVE, and DIRECT have negative effects on the observed child's behavior, whereas similar behavior of the father has no such negative effects on the child's active approach to the task in P-C interaction. Rather, the father's INTERFER fostered the child's confidence, which further facilitated active exploration of novel objects.

Similar differences between the father and the mother's effects on the child's behavior was also found according to the primary school teacher's ratings of child behavior. That is, the child's positive and adaptive behavior characteristics as rated by teacher have a positive correlation with the father's SENSITIVITY, but a negative correlation with the mother's INTERFER.

These results suggest that the significant variables of parental behavior which enhance the child's intellectual functioning are: non-INTERFER and less-INVOLVEMENT in the child's task for the mother, and SENSITIVITY to the child for the father.

In the present study, mainly correlational analysis were carried out in an attempt to

clarify the influences of parental behavior on the child's cognitive development. The question of whether a combination of a sensitive father and a less restrictive mother in a family would result in positive effects on the child's cognitive development remains open. Similarly, the effects of the other possible combinations such as sensitive father and restrictive mother, insensitive father and less restrictive mother, etc. must await typological analysis for a more satisfactory answer.

There are also several differences between the father and the mother in their influences on C. P. M. A notable result is that the father's SENSITIVITY/INTERFER and DIRECT result in the child's reflective/impulsive behavior as measured by M. F. F. test, however, maternal behaviors have no relationships with the child's reflective or impulsive behavior.

In comparison to maternal interference, paternal interference has more negative effect on the child's level of aspiration, and the same result is obtained in the child's MOTIVATION, one of the teacher's ratings of child behavior in primary school. The results suggest that in order for the child to maintain high motivation, it is more important to be free from paternal interference than from maternal interference. The above findings bear similarity to the result of a study of Rosen and D'Andrade (1959), which reported that the father whose children showed high achievement motivation, gave his child a relatively high degree of autonomy.

The difference between the father and the mother's role in influencing the child's cognitive development is also found in the child's exploration of the novel objects. Saxe and Stollak (1971) showed that mothers of highly curious boys displayed more positive feeling and fewer restrictiveness than mothers of low curious boys. The present study also showed that the mother's restrictiveness has negative effect on the child's object exploration. However, paternal restrictiveness promotes the child's confidence, which further facilitates the child's active exploration and eventually leads to the child's explorative behavior. From this, it is not unreasonable to infer that the father's moderate restrictiveness and control is conducive to the child's high curiosity. It is possible that the observed paternal restrictiveness might differ from maternal restrictiveness in terms of its perceived psychological meaning for children.

### *3. Differences of behaviors in task and free-play session*

In the present study, parent-child interaction was observed in both Task session and Free-play session. Parental behavior in Task session showed a stronger correlation with the child's cognitive attainment. This result is primarily due to the fact that the Task session resembles a test in which the children must complete the task under definite condition. As the patterns of correlational data between variables of parental behaviors and those of the child differed according to the situations. It is a matter of course that the parent-child interaction should be observed in several situations in order to gain a complete picture of the parent-child relationship.

The inconsistency between the child's behavior in father-child interaction and the child's behavior as rated by the nursery school teacher is perhaps due to the fact that in ordinary life, it is rare for the father to be alone with the child. That is, the situation is not representative of "normal" father-child interactive situations.

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