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# THE MEDIATIONAL ROLE OF THE CHILD'S STYLE OF REACTION IN DETERMINING THE RELATIONSHIP BETWEEN MATERNAL BEHAVIOR AND THE CHILD'S COGNITIVE DEVELOPMENT

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## INTRODUCTION

The relationship between individual differences in cognitive development and the "environmental factors" has been one of the main concerns in the field of socialization studies which has been getting very popular in recent years (e. g. Hess, 1970). These studies have the common goal of attempting to clarify the nature of the environmental stimulations in influencing cognitive development. Among environmental factors, the effects of maternal behavior on the child's cognitive growth has been investigated. The method employed in these studies has been correlational analyses of variables (e. g. Clark-Stewart, 1977 ; Parke, 1978).

There is some evidence, however, indicating that the relationship between a certain maternal behavior and a certain aspect of the child's cognitive development in one society is not necessarily the same as that of another society (Miyake & Azuma, 1978 ; Tajima et al., 1978). For example, among our Japanese cases, the mother's directiveness as manifested in her verbal expressions such as "Now take the blue pegs—see? —start on—look here!", was found to be negatively correlated with the child's IQ at 6:0, whereas no such relationship was found in U. S. sample (Tajima et al. 1978).

Such different effects of maternal behavior in different social contexts have been attributed to the effects of "culture difference" (cf. Azuma & Hess 1976).

However, as far as the relationship between maternal behavior and the child's cognitive development is concerned, such a global, sociological concept tells us little about the mechanism involved. We believe that in order to shed some light on the problem, some psychological variables should be formulated and their functional relationship be identified. Furthermore, in order to clearly identify the functional relationship between maternal

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This study is based on the analysis of part of the data from a cross-cultural study, "The Influence of Socializing Agents upon Cognitive Functioning, Communication Style and Educability of Preschool Children in Japan and the U. S.", co-directed by Dr. R. D. Hess, Stanford University in the United States and Dr. H. Azuma, Tokyo University in Japan. The data presented here were all collected in Japan and the name of other individuals who have participated in analyzing these data are : Hiroshi Usui, Hokkaido University of Education ; Tsuguyo Hamana. The Japanese part of the project was supported by a grant from the Japanese Society for the Promotion of Science and a grant from the ESSO Foundation. Computation was run at the computer center at Hokkaido University, using SPSS. The authors are very much indebted to U. S. and Japanese colleagues of the project for their invaluable suggestions. Thanks are also due to Shing-jen Chen for his editing and proofreading. Requests for reprints should be addressed to Nobumoto Tajima, Department of Developmental Psychology, Hokkaido University, Kita 11, Nishi 7, Kita ku, Sapporo-shi, Japan 060.

behavior and the child's cognitive development, it would be necessary to take into consideration the existence of some mediational variables.

The present study is meant to be a first step toward such a goal and it is hoped that, as a result, functional roles of the mediational variables will be better understood. In addition, we believe that this can be achieved by investigating a domestic sample.

Our first task is to identify some variables as mediators. What then can be considered as hopeful candidates for the mediators? Here the arguments proposed by Hess & Shipman (1965) seem to provide some clues. One of their arguments was that the child's cognitive development is fostered in a family control system which offers and permits a wide range of alternatives of the child's action and thought. Whereas in status-oriented family where control is executed by appealing to status or ascribed role norms, children tend to become passive or compliant in their attitude toward learning and they tend to reach solutions impulsively or hastily.

This argument seems to imply that a certain maternal behavior would evoke a certain child behavior which is closely related with the child's later cognitive development. Thus it is possible to consider the child's reactions to maternal behaviors as playing the role of a mediator between maternal behavior and the child's cognitive development.

In light of the above argument, it would follow that an understanding of the kind of individual differences in the child's behaviors as evoked by certain maternal behaviors would be a prerequisite for the understanding of the effects of maternal behavior on the child's cognitive development.

In this paper we will look first into the problem of the mediational role of the child's style of reaction to maternal behavior during interaction in determining the relationship between maternal behavior and the child's cognitive development. This can be achieved by analyzing both the relation of the child's behavior to maternal behavior as well as the relation between the child's behavior and his/her cognitive development. That is to say, we want to make clear which aspect of maternal behavior during interaction would be related to which aspect of the child's reaction and also find out how that particular reaction of the child would be related to later cognitive development.

Taking Hess's argument as a starting point, we formulate the following hypothesis concerning maternal initiative during interaction. We hypothesize that the mother's initiative or her directiveness will be correlated with the child's impulsiveness or passivity not only in structured situation as shown by Hess, but also in less structured free play situation, and that these aspects of the child's behavior will be correlated with his/her poor performance in cognitive development tests implemented one or two year later.

The second task of this study will be to examine whether individual differences in the style of the child's reaction toward maternal behavior can be found. If the child's reaction toward maternal behavior is considered as a mediator between maternal behavior and the child's cognitive development, the relationship between them will be determined to some extent by the individual differences in the child's reaction.

One aspect of individual differences to be discussed in this paper is sex difference. The existence of sex difference in the child's cognitive development in relation to "environmental factors" have repeatedly been reported (Bayley, 1954; Kagan & Moss, 1959; Honzik, 1963). In this connection, Kagan & Moss's finding is particularly interesting. They

showed that maternal education was a better predictor of the IQ of girls than that of boys at age 3, 6 and 10. This finding seems to indicate that sex difference exists also in the effects of maternal behavior toward the child's behavior, namely, girls are more susceptible than boys to environmental pressure. Thus, we also hypothesized that the number of significant correlations between maternal behavior and the child's behavior will be much higher for girls than for boys.

## METHOD

### *1 Subjects*

Twenty-nine boys and 29 girls and their mothers, living either in the Tokyo metropolitan area or Sapporo city, Hokkaido, served as subjects. Both mothers and children were observed and tested at five intervals when the children were between the ages of 3 years 8 months and 6 years.

### *2 Procedures for Measurement, and Variables*

#### (1) Ratings of the mother's behavior and of the child's behavior

When children were 4 years old, all mother and child pairs were observed in an interaction task situation named the "Unstructured game (U game)". In the U game, both the mother and the child were free to use a pegboard which had 63 multi-colored pegs to be put into the holes on the board to make various patterns such as a house, a tree or a ship. Two sets of these items were used, one for the mother and the other for the child. No instruction was given about how to use the material, however. A ten-minute video-tape recording was made to record the mother-child interaction. They were unaware that they were being observed. Immediately after viewing the recorded interaction, three experienced raters independently evaluated the mother's behavior toward her child for 6 items and the child's behavior for 5 items.

Ratings were made by using a seven-point scale. The following is a list of the items rated.

#### a) Maternal behavior

- 1) Press: to press the child to do the game well
- 2) Orientation: to give instructions and specific tasks in advance
- 3) Control: to control or constrain the child's activities
- 4) Involvement: to be highly involved in the child's task
- 5) Sensitivity: to be sensitive to the child's motivation, ability and interest so that the child's task was facilitated
- 6) Praise: to praise the child very frequently

#### b) Child's behavior

- 1) Reflection: tendency to ponder upon alternative solutions
- 2) Originality: tendency to approach a solution creatively
- 3) Persistence: tendency to be engaged in one activity for a long time
- 4) Independence: tendency not to ask for the mother's help
- 5) Activity: tendency to approach the task positively

Each scale was described in terms of the typical behaviors representing the two extremes of a cotinum (1—7). For example, the item Press has the following descriptions :

- 1: regarding the situation as just for fun: as if playing chess pieces with the child.
- 7: regarding the situation as an intellectual challenge for the child; presenting it as a constructive task and pressing the child to do it well; teaching numbers, colors or shapes and having the child repeated them.

Since correlation coefficients between raters (averaged over the 11 items by Z-transformation) were all better than .70, a high reliability among raters was obtained. The mean rating scores were used in the analysis.

Two factors emerged through the principal factor analysis with varimax rotation on items of mother behavior ratings. Four items (Press, Orientation, Control and Involvement) had larger loading than .76 on the first factor (all positive), therefore, they reflect the mother's "Directiveness",\* representing the magnitude of maternal initiative or directiveness of the child's task in interaction situation. Each mother was given a Directiveness score by adding up her rating scores on those four items.

The second factor had large loading in items such as Sensitivity (.79), Praise (.82), and at the same time they both had smaller loading than .20 on the first factor. This factor which indicates the mother's facilitation and positive evaluation of the child's activities by giving consideration for the child's cognitive and motivational level, is named the mother's "Sensitivity". Sensitivity score was also given to each mother by adding up the mean ratings on Sensitivity and Praise.

## (2) Coding categories of the mother's verbal behavior

In order to make clear the verbal characteristics of mother behavior ratings, an analysis of the verbal interaction process between each mother and her child was carried out.

The verbatim transcription was made from the videotape, and the whole session of verbal exchange between the mother and the child was divided into some 60 to 160 Communication Units (CU), a CU being the smallest unit for the exchange of an idea to be completed or interrupted by another idea. All the CUs were classified into 8 categories and several subcategories by considering the meaning and the function of each utterance. These categories and subcategories are as follows.

A: Utterances expecting some responses from the partner

1. Q(Question) ———to elicit yes/no answer (YNQ; Yes-No question) or explanation (WHQ; WH question), to ask for the partner's explanation in order to confirm his/her intention (CNQ; Confirmative question)
2. D(Direction) ———to demand a specific action of the partner
3. P(Proposition) ———to lead indirectly the partner to a specific action

B: Utterances in response to the partner's elicitation

4. R(Response) ———to give an affirmative or a negative answer to YNQ
5. E(Explanation) ———to give an explanatory answer to WHQ or CNQ
6. A(Acceptance) ———to give an affirmative answer, showing acceptance or consent

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\* This factor was termed "Structuring the situation" in an earlier report (Tajima et al., 1978)

- to D, P, or S(Statement ; indicated below)
7. N(Negation) ———to give a negative answer (NG ; Negation) or refusal (NR ; Rejection) to D, P or S
- C : Utterances which do not necessarily expect response from the partner
8. S(Statement) ———to give information, with or without the intention of attracting the partner's attention

Agreement concerning the division and categorization of the verbal communication between two analyzers working independently was better than .85. In Fig. 1 is shown an example of the division and categorization of the data.

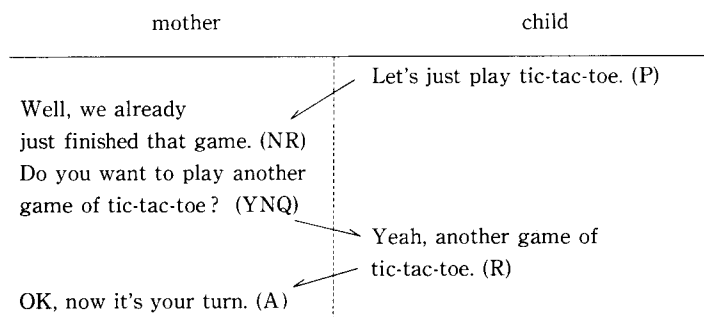


FIGURE 1 An example of the division and categorization

Between the frequencies of these 8 categories on the mother's verbal behavior and two maternal behavior rating composite scores, Question (total score of YNQ and WHQ), Confirmative question and Acceptance showed negative correlation only with Directiveness (respectively,  $r = -.23$  ( $p < .05$ ),  $r = -.25$  ( $p < .05$ ),  $r = -.33$  ( $p < .01$ )). On the contrary, both Direction and Negation (total score of NG and NR) were positively correlated with Directiveness (respectively,  $r = .41$  ( $p < .01$ ),  $r = .31$  ( $p < .01$ )), and negatively correlated with Sensitivity ( $r = -.30$  ( $p < .01$ ),  $r = -.41$  ( $p < .01$ )). Thus, these 5 categories, indicating the verbal characteristics of maternal behaviors described by ratings, were used for later analysis.

### (3) Child's cognitive measures

#### (i) Verbal concept at age 4

The composite score of verbal concept was constructed from two independent test scores through Z-transformation, one of the tests used was the Palmer's Concept Familiarity Index (CFI) (Palmer, 1970) and the other was, Peabody Picture Vocabulary Test (PPVT) (Dunn, 1965). These tests were administered to each child when he/she was 3: 8 and 4: 0 respectively. The Japanese version of PPVT for young children (Tajima & Nagano, 1974) consists of 70 items, in each of which the child was asked to point out the one picture out of four alternatives which best corresponded to the word the experimenter gave. This composite score was used for estimating the child's cognitive ability already existing at the time of the observed interaction when the child was 4 years of age.

## (ii) School-related skills

*Literacy* ; A measure for the verbal aspect of school readiness was constructed by combining three separate measures shown below. A Z-transformation was also performed to obtain a composite score. The number in parentheses indicates the age of the child tested.

- 1 (5 : 0) ability of the child to write his/her own name
- 2 (5 : 0) recognition of Hirakana (Japanese alphabets)
- 3 (6 : 0) ability of the child to read words in Hirakana

*Number* ; A measure for arithmetic skills was the sum of the Z-transformation scores of the following three independent tests.

- 1 (5 : 0) counting ; the child was asked to pick up 4, 7, 5, 11, and 13 marble *go* pieces from among 25 pieces.
- 2 (5 : 0) adding ; the child was asked to calculate the result of adding one piece of candy to five.
- 3 (6 : 0) arithmetic skills including size-judgement, reading of the digit and calculation. These tasks are the equivalents of Metropolitan Readiness Tests (Hildreth et al., 1964)

*School Readiness* ; the total score of Literacy and Number

## (iii) IQ test

A Takemasa-Binet Intelligence Test, a Japanese version of the Stanford-Binet Test (Takemasa et al., 1959) was given when the child was six.

## (iv) Spatial-perception measure

The spatial-perception measure was derived from Z-transformation of scores of tests administered to the child at ages four, five and six respectively. The two tasks at age four (averaged 3 : 8) were, first, the selection of Palmer's CFI, that dealt with spatial relations, and secondly, the test, called the Simple Perceptual Discrimination Test (SPD), consisting of three subtests : 1) an object assembly test taken from Wechsler Intelligence Scale for Children (Wechsler, 1949), 2) a bear puzzle, and 3) a block designs test taken from the Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 1967). The task at age five consisted of Matching Familiar Figures Test, designed originally by Kagan (1965) and later modified for preschool populations by Wright and his colleagues at the University of Kansas (Wright, 1971). Also, at age five, a cross-modal transfer task was administered. This called for matching tactile cues, obtained by touching an invisible object in a box, to one of an array of 4 objects the child was shown (Hatano & Inagaki, 1976). The task at age six was the block subtest of the WISC.

## (v) Test of number conservation at age 6

This test was constructed mainly by following the work of Hatano & Suga (1969). As one of two parallel rows of four black and 4 white *go* stones (marbles) was extended or shortened to a certain degree, the child was asked to respond to following questions : "Which has more? Are there more blacks or are there more whites? Is there an equal number of each?". The total number of correct responses to the questions was used in the analysis.

TABLE 1  
Partial Correlations between Maternal Behaviors and Child Behaviors

Maternal Variables	Child Behavior Ratings				
	Reflection	Originality	Persistence	Independence	Activity
Behavior Ratings					
Directiveness <sup>a</sup>	-.17°	-.24*	.08	-.54**	-.26*
Press	-.10	-.15	.14	-.46**	-.19°
Orientation	-.22*	-.21*	-.01	-.56**	-.37**
Control	-.28**	-.33**	.02	-.60**	-.33**
Involvement	-.03	-.19°	.15	-.42**	-.06
Sensitivity <sup>a</sup>	.29**	.17°	.22*	.19°	.34**
Sensitivity	.28**	.18°	.23*	.17°	.33**
Praise	.25*	.14	.16	.18°	.30**
Verbal Behavior Categories					
Question	.28**	.36**	.07	.31**	.19°
Negation	-.09	-.17°	.13	-.12	-.08
Confirmative Question	.22*	.44**	.05	.28**	.18°
Direction	-.30**	-.32**	.09	-.32**	-.22*
Acceptance	.29**	.27*	-.08	.38**	.30**

Note—"a" denotes composite variables; °  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$

## RESULTS

The relationship between maternal behavior ratings and the mother's verbal behavior categories on the one hand, and the child's behavior ratings on the other, are shown in table 1, when the child's verbal concept score at age 4 was partialled out in order to eliminate the confounding effects of the child's ability on maternal behavior (cf. Hatano et al. in press).

The mother's Directiveness, including two of the component variables; Orientation and Control, were negatively correlated with all the child's behavior rating scales except one (The child's Persistence showed no significant correlation). In the mother's verbal behavior categories, Direction had the same relationship as Directiveness with the child's behavior ratings, while Question, Confirmative Question and Acceptance revealed an opposite relationship. These results indicate that mothers who directly orient and control their children's activities or mothers who give direct verbal instructions rather than using indirect instructions, such as "Question", "Confirmative Question", or showing "Acceptance," tend to make their children more impulsive, dependent and passive, and less original.

On the contrary, the mother's Sensitivity and its component variables, as opposed to Directiveness, were positively correlated with the child's Reflection, Originality, Independence and Activity. Furthermore, Sensitivity also showed positive correlation with the child's Persistence which had no relation to Directiveness. These results suggest that mothers who show sensitivity toward their children's behaviors and praise their children a lot, tend to facilitate not only their children's reflection, originality, independence and activity but also their persistence, that is, all of the child's behavior rated here.

TABLE 2

Sex Differences in Correlations between Maternal Behaviors and Child Behaviors

Maternal variables	Child Behavior Ratings									
	Reflection		Originality		Persistence		Independence		Activity	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
<b>Behavior Ratings</b>										
Directiveness <sup>a</sup>	-.03	-.32*	.11	-.57**	.16	-.05	-.29 <sup>°</sup>	-.74**	.13	-.60**
Press	.08	-.32*	.19	-.53**	.27 <sup>°</sup>	-.08	-.17	-.72**	.23	-.59**
Orientation	-.15	-.30*	.08	-.47**	.25 <sup>°</sup>	-.07	-.35*	-.69**	-.02	-.61**
Control	-.14	-.42**	.01	-.62**	.08	-.06	-.36*	-.76**	.06	-.65**
Involvement	.07	-.15	.12	-.52**	.21	.06	-.23	-.63**	.20	-.36**
Sensitivity <sup>a</sup>	.30*	.30*	.30*	.07	.26 <sup>°</sup>	.13	.14	.20	.30*	.38*
Sensitivity	.29 <sup>°</sup>	.31*	.31*	.06	.27	.15	.19	.12	.34*	.33*
Praise	.27 <sup>°</sup>	.26 <sup>°</sup>	.24 <sup>°</sup>	.07	.20	.10	.06	.26 <sup>°</sup>	.21	.38*
<b>Verbal Behavior Categories</b>										
Question	.34*	.20	.29 <sup>°</sup>	.40**	.21	-.14	.20	.43**	.19	.21
Negation	-.03	-.16	-.20	-.17	.21	.16	-.02	-.17	.16	-.26 <sup>°</sup>
Confirmative Question	.20	.27 <sup>°</sup>	.40**	.51**	.00	.13	.31*	.24 <sup>°</sup>	.04	.32*
Direction	-.39**	-.23	-.41**	-.29 <sup>°</sup>	-.12	-.34*	-.37*	-.27 <sup>°</sup>	-.22	-.20
Acceptance	.35*	.25 <sup>°</sup>	.30*	.33*	-.08	-.05	.29 <sup>°</sup>	.43**	.19	.37*

Note—"a" denotes composite variables; <sup>°</sup> p < .10, \* p < .05, \*\* p < .01; Boys: N = 29, Girls: N = 29; The significant difference between the underlined pairs of correlation coefficients means p < .10, for italic: p < .05, for blackfaced: p < .01

Sex difference in correlations between maternal behavior variables and the child's behavior ratings is shown in table 2. Significant sex differences in the relationship between the mother's behavior and the child's behavior is seen only in the negative effects of the mother's Directiveness on the child's Originality, Independence and Activity. In addition, Directiveness and its component variables, such as Orientation and Control, show negative correlations with all of the girls' behaviors except Persistence. While no significant negative correlation is obtained in boys except Independence, however. This indicates that negative effects on the mother's directive control on the child's behaviors tend to be much greater in girls than in boys.

TABLE 3

Partial Correlations between Child Behaviors and Cognitive Development Tests

Cognitive Measures	Child Behavior Ratings				
	Reflection	Originality	Persistence	Independence	Activity
Literacy	.21*	.01	.28**	.16	.12
Number	.20*	-.15	.20*	.00	.09
School Readiness	.24*	-.08	.30**	.10	.13
IQ	.34**	.07	.29**	.21*	.20*
Spatial Perception	.40**	-.01	.40**	.17°	.31**
Conservation	.38**	.07	.06	.14	.09

Note—°  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$

In table 3 are shown the relations of the child's behavior ratings to later cognitive measures with the child's ability at the time of observed interaction partialled out. The interesting results were that Reflection was positively correlated with all of the criterion measures, and that Persistence also showed the same relationship as Reflection with the child's cognitive measures except Conservation. Though Independence and Activity showed positive correlation with the IQ and Spatial perception, Creativity had no significant correlation with any of the measures on the child's cognitive development.

From our discussion so far, the following statements can be made.

- (1) The mother's Directiveness or the mother's verbal behaviors, (such as occasional Question and Acceptance, and frequent Direction), tend to inhibit the child's Reflection, Activity and Independence. Therefore, the mother's Directiveness will have negative effects on all aspects of the child's cognitive development later on. This tendency is especially strong in girls.
- (2) The mother's Sensitivity tends to facilitate all of the child's behavior especially Reflection and Persistence, consequently, it will have positive effects on later cognitive development in boys and girls as well.

## DISCUSSION

The most important finding of the present study was that certain maternal behaviors were related to certain child reactive behaviors, and that this reactive behavior of the child was in turn related to the child's performance on cognitive tests later on. Among maternal behaviors, the mother's Directiveness and her verbal expressions such as frequent Direction, occasional Question, occasional Acceptance were related to her child's impulsiveness, inactivity and dependence, and these characteristics of the child were in turn related to his/her poor performance in cognitive development tests one or two years later.

These results support the hypothesis put forth in the beginning of this paper, and they corroborate Hess's arguments (Hess & Shipman, 1965). To sum up, the results suggested that the child's reaction toward his/her mother's behavior during interaction most probably plays the role of mediator between maternal behaviors and the child's

cognitive development. Furthermore, it should be noted that maternal behaviors do not directly cause the child's cognitive development. Rather it is the child's reaction toward the mother's behavior that mediates maternal influence on the child's performance. In this connection Radin (1971) and Epstein & Radin (1974) pointed out the importance of the preschooler's achievement motivation which intervenes between parental behavior and cognitive functioning. As for infancy, Stevenson & Lamb (1979) identified the effect of infant sociability on the infant cognitive performance.

On the other hand, the mother's Sensitivity, as opposed to her Directiveness, had positive relationship with the child's reflection, activity and independence. Moreover, Sensitivity also showed positive correlation with the child's persistence which, however, had no relation to Directiveness. As the child's persistence was positively correlated with most of the cognitive development tests later on, the results concerning the relationship between Sensitivity and the child's behaviors clearly suggest that when one considers the effects of maternal behaviors on the child's cognitive development, more than just the mother's Directiveness must be considered.

The positive effects of the mother's Sensitivity on all aspects of the child's behaviors and, consequently, the child's cognitive development seem to be attributable, at least in part, to the mother's indirect and rational control which allows and encourages her child to pursue his/her own activities. Concerning this, Clark-Stewart (1977) expressed a similar view. She suggests that as far as preschool children are concerned, the reasonable and rational parental control that appeals to reason and feeling rather than imposing rules tends to affect all aspects of development by enhancing the child's own interaction with "environment". This suggestion also seems to explain the negative effects of the mother's Directiveness on the child's behavior and on the development of the child's competence.

Another important finding was that sex difference was found in the child's reactions toward the mother's behaviors, i. e. the negative correlation between the mother's Directiveness and the child's behaviors was seen only in girls except Independence, while concerning the relation of the mother's Sensitivity to the child's behavior no such sex difference was found. This finding suggests that girls would be more susceptible than boys to maternal direct control as hypothesized above.

This also suggests that the negative effects of the mother's Directiveness on the child's cognitive development would be much greater in girls than in boys because, as stated before, girls' behaviors evoked by Directiveness would be antecedents of poor cognitive performance later on. If it is so, our finding is consistent with the previous studies (Bayley, 1954; Kagan & Moss, 1959) which indicate sex difference in the effects of "parental factors" on the child's cognitive development, i. e. the relation between parental education and the girls' IQ was found before five years of age, while no such relation was found in boys before this period.

If the child's reactions toward the mother's behaviors are considered as a mediator between maternal behavior and the child's cognitive development, the individual differences in these reaction would be an important factor when the different effects of a certain maternal behavior on a certain child's cognitive development have to be explained in terms of psychological variables. Concerning this point, the different effects of maternal behavior in different social contexts can be also interpreted as difference of the child's style of

reaction towards the mother's behaviors (see Tajima et al., 1978). That is to say, the negative effects of the mother's direction as manifested in her verbal expressions on the child's IQ, observable in the Japanese, but not in the U. S. sample, depend on whether the child's behaviors themselves are negatively affected by the mother's direction or not. Whether and why American children's behaviors are not negatively affected by their mother's directiveness calls for further analyses and investigations.

The above discussion clearly suggests that in studying cognitive socialization, it is important to consider the role of some mediational variables, because the child's style of reaction toward the mother's behavior seems to be important in determining the relationship between maternal behavior and the child's cognitive development. Moreover, an examination of individual difference in the child's reactive behavior from the view point of sex/social/cultural difference enables us to better understand the complex effects of "environmental factor" on the child's cognitive development.

#### REFERENCE

- Azuma, H. & Hess, R. D. The effects of verbal environment on child's cognitive growth. *The Annual Report of Educational Psychology in Japan*. 16, 87-92. Japanese Association of Educational Psychology, 1977. (in Japanese)
- Bayley, N. Some increasing parent-child similarities during the growth of children. *Journal of Educational Psychology*. 1954, 45, 1-12.
- Clark-Stewart, K. A. *Child care in the family : A review of research and some propositions for policy*. Academic Press, 1977.
- Dunn, L. M. *Peabody picture vocabulary test manual*. Circle Pines, Minn : American Guidance Service, 1965.
- Epstein, A. S. & Radin, N. Motivational components related to father behavior and cognitive functioning in preschoolers. *Child Development*, 1975, 46, 831-839.
- Hatano, G. & Inagaki, K. Reflection-Impulsivity in perceptual and conceptual matching tasks among kindergarten children. *Japanese Psychological Research*. 1976, 18, 4, 196-203.
- Hatano, G., Miyake, K. & Tajima, N. Mother behavior in an unstructured situation and child's acquisition of number conservation. *Child Development*, 1980, 51, 2 (in press).
- Hatano, G. & Suga, Y. Equilibration and external reinforcement in the acquisition of number conservation. *Japanese Psychological Research*, 1969, 11, 17-31.
- Hess, R. D. Social class and ethnic influences on socialization. In P. H. Mussen (Ed.), *Carmichael's manual of child psychology*, 3rd. Ed. Wiley 1970, 475-557.
- Hess, R. D. & Shipman, V. C. Early experience and the socialization of cognitive modes in children. *Child Development*, 1965, 34, 869-886.
- Hildreth, G. H., Griffith, N. L., & McGauvran, M. E. *Metropolitan Readiness Tests : Form A*. New York : Harcourt, Brace & World, 1964.
- Honzik, M. P. A sex differences in the age of onset of the parent-child resemblance in intelligence. *Journal of Educational Psychology*, 1963, 54, 231-237.
- Kagan, J. Impulsive and reflective children : Significance of conceptual tempo. In J. D. Krumboltz (Ed.), *Learning and the educational process*. Chicago : Rand McNally, 1965, 133-161.
- Kagan, J. & Moss, H. A. A parental correlates of child's IQ and height : A cross-validation of the Berkeley Growth Study results. *Child Development*, 1959, 30, 325-332.
- Miyake, N. & Azuma, H. Maternal communication style and its effects on child cognitive development. Japan-U. S. comparison on a referential communication task. *The Japanese Journal of Educa-*

- tional Psychology*, 1978, 27, 75-84 (in Japanese).
- Palmer, F. H. Socioeconomic status and intellectual performance among Negro preschool boys. *Developmental Psychology*, 1979, 3, 1-9.
- Parke, R. D. Children's home environments: Social and cognitive effects. In I. Altman & J. F. Wohlwill (Eds.), *Children and the environment*. Plenum Press, 1978, 33-81.
- Radin, N. Maternal warmth, achievement motivation and cognitive functioning in lower-class preschool children. *Child Development*, 1971, 42, 1560-1565.
- Stevenson, M. B. & Lamb, M. E. Effects of infant sociability and the caretaking environment on infant cognitive performance. *Child Development*, 1979, 50, 340-349.
- Tajima, N., Miyake, K., Hamana, T. & Usui, H. A cross-cultural study on the nature of mother-child interaction and its effects on child's cognitive growth: An interim report. *Working paper of the Research and Clinical Center for Child Development, Hokkaido University*, 1978, No. 1.
- Tajima, N. & Nagano, S. An attempt to construct a vocabulary test for young children. *Paper presented at the 16th Annual Convention of the Japanese Association of Educational Psychology*, September 1974. (in Japanese).
- Takemasa, T., Tatsuno, C. & Okamoto, K. *Takemasa-Binet shiki chino kensa no kaisetsu (Manual for Takemasa-Binet intelligence test)*. Tokyo: Kaneko-shobo, 1959.
- Wechsler, D. *Manual for the Wechsler Intelligence Scale for Children*. New York, Psychological Corp., 1949.
- Wechsler, D. *Manual for the Wechsler Preschool and Primary Scale of Intelligence*. New York, Psychological Corp., 1976.
- Wright, J. C. *The Kansas Reflection-Impulsivity Scale for Preschoolers*, Cemrel, 1971.