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**Maternal behavior and child competence**

**Melby, Janet Nieuwsma, Ph.D.**

**Iowa State University, 1988**

**U·M·I**  
300 N. Zeeb Rd.  
Ann Arbor, MI 48106

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**Maternal behavior and child competence**

**by**

**Janet Nieuwsma Melby**

**A Dissertation Submitted to the  
Graduate Faculty in Partial Fulfillment of the  
Requirements for the Degree of**

**DOCTOR OF PHILOSOPHY**

**Major: Child Development**

**Approved:**

Signature was redacted for privacy.

**In Charge of Major Work**

Signature was redacted for privacy.

**For the Major Department**

Signature was redacted for privacy.

**For the Graduate College**

**Members of the Committee:**

Signature was redacted for privacy.

**Iowa State University  
Ames, Iowa**

**1988**

## Table of Contents

	Page
General Introduction	1
Explanation of Dissertation Format	1
Review of Literature	3
Section I. Observed Maternal Behavior, Child Competence and Family Social Status	15
Abstract	17
Introduction	19
Purpose	21
Method	23
Subjects	23
Measures	24
Peabody Picture Vocabulary Test-Revised	24
Parent-Child Interaction Code	24
Four Factor Index of Social Position	25
Procedures	26
Data collection	26
Problem-solving task	26
Behavioral coding	26
Computation of agreement and reliability	27
Statistical Treatment	29
Pooled scores	29
Data transformations	29

Statistical tests	30
Results	32
Stability and Change in Maternal Behaviors	32
Across-year, within-variable correlations	32
Across-year, within-variable <i>t</i> -tests	33
Reciprocal Influence Between Maternal Behaviors and Child Competence	34
Within-year, across-variable correlations for Yr 1	34
Within-year, across-variable correlations for Yr 2	35
Across-year, across-variable correlations for maternal behaviors and child's competence	36
Regression analyses	37
Relationship of Family Social Status to Maternal Behaviors and Child's Competence	38
Correlation of maternal behavior and child competence at Yr 1 with family social status at Yr 1	38
Correlation of maternal behavior and child competence at Yr 2 with family social status at Yr 1	39
Regression analyses	40
Summary	42
References	48
Section II. Multi-method Assessment of Maternal Behavior and Child Competence Over Time	64
Abstract	66

Introduction	68
Purpose	71
Method	72
Subjects	72
Measures	73
Peabody Picture Vocabulary Test-Revised	73
Parent-Child Interaction Code	73
Q-Sort Inventory of Parenting Behaviors	73
Iowa Inventory for Parent Assessment of Children's Competencies	74
Four Factor Index of Social Position	74
Procedures	74
Data collection	74
Problem-solving task	75
Observational coding	75
Q-Sort statement subset	77
IIPACC factors	78
Statistical Treatment	78
Transformation of behavioral data	78
Statistical tests	79
Results	80
Maternal Assessment and Objective Assessment of the Child's Competence	80
Within- and across-year correlations	80
Maternal Perception and Objective Observation of Maternal Parenting Behavior	81

Within-measure correlations using maternal Q-Sort parenting perceptions	81
Within-measure correlations using observations of maternal parenting behaviors (frequencies and durations)	82
Across-measure correlations comparing observed maternal parenting behaviors (frequencies and durations) with maternal Q-Sort perceptions of parenting behaviors	82
Maternal Behavior and the Child's Competence	85
Within- and across-year correlations of maternal Q-Sort perceptions of parenting behaviors with objective and subjective child measures	85
Within- and across-year correlations of observed maternal parenting behaviors (frequencies and durations) with objective and subjective child measures	87
Prediction of the child's competence using regression procedures	89
Discussion	91
References	95
General Summary and Implications	103
General Summary	103
Implications	109
Literature Cited	113
Acknowledgments	119
Appendix	121

## List of Tables

	Page
Section I.	
Table 1. Maternal Behavioral Categories and Associated Verbal and Nonverbal Behavioral Descriptors of the Parent-Child Interaction Code	53
Table 2. Inter-observer Agreement (Correlations and Effective Percent Agreement) for Maternal Behavior Categories	54
Table 3. Between Year Correlations for the Maternal Behavior Categories	55
Table 4. Paired Comparison Results (Means, Standard Deviations, $t$ -tests) for Maternal Behavior Changes from Yr 1 to Yr 2 (Frequencies and Durations)	56
Table 5. Pearson Product-Moment Correlations, Means, and Standard Deviations for Yr 1 Variables (Frequencies Above and Durations Below the Diagonal)	57
Table 6. Pearson Product-Moment Correlations, Means, and Standard Deviations for Yr 2 Variables (Frequencies Above and Durations Below the Diagonal)	59
Table 7. Pearson Product-Moment Correlations, Means, and Standard Deviations for the Between Year Variables	61
Table 8. Pearson Product-Moment Correlations of Social Status (Yr 1) with Maternal Behavior (Yr 1 and Yr 2) and Child Competence (Yr 1 and Yr 2)	63
Section II.	
Table 1. Pearson Product-Moment Correlation of Child's PPVT-R Scores (Yrs 1, 2, and 3) and Mother's Assessment of the Child on the IIPACC Mentally Alert Factor (Yr 3)	98
Table 2. Pearson Product-Moment Correlations of Maternal Perception (G-Sort) of Parenting Behaviors (Yrs 1, 2, and 3)	99



Table 3.	Correlation of Maternal Perception (Q-Sort) of Parenting Behaviors (Yrs 1, 2, and 3) with Observed Frequencies of Maternal Parenting Behaviors	100
Table 4.	Correlation of Maternal Perception (Q-Sort) of Parenting Behaviors (Yrs 1, 2, and 3) with Observed Durations of Maternal Behaviors (Yrs 1 and 2)	101
Table 5.	Correlations of Maternal Perception (Q-Sort) of Parenting Behaviors (Yrs 1, 2, and 3), the Child's PPVT-R Scores, Maternal IIPACC Mentally Alert Factor (Yr 3), and Social Status (Yr 1)	102

#### General Summary and Implications

Table 1.	Concepts and Instruments Used in the Study of Maternal Behavior and Child Competence Over Time	117
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List of Figures

	Page
Figure 1. The relationship of maternal behavior, child's competence and family social status over time	52

## General Introduction

### Explanation of Dissertation Format

The research in this dissertation is presented in manuscript form. This format has been approved by the Iowa State University Graduate Faculty. Both manuscripts within the dissertation meet the criteria for publication in professional journals.

The review of literature contains an expanded discussion of references cited in the two manuscripts. Within the literature review previous studies of the relationship between parent-child interaction and the child's competence are described. A socially oriented view of cognitive development, which serves as the foundation for the present investigation, is discussed. The need for a multi-method approach to studying parent-child interaction and the child's competence, as well as areas of research need, are identified.

The first manuscript, presented in Section I, is an examination of changes in maternal behavior over time, the relationship between maternal behavior and the child's competence within and across time, and the manner in which family social status is related to maternal behavior and the child's competence. The study used data from the first two years of a regional longitudinal study, NC-158, "A Study of Parenting Beliefs in Rural and Urban Populations" (Lawton, Colman, Boger, Pease, Galejs, Looney, & Poresky, 1983).

The second manuscript, found in Section II, assessed the manner in which the mother's perception of her own parenting behaviors and her

assessment of the child's competence are related to observations of maternal behavior and to the child's actual cognitive (verbal) competence. Of particular interest are the relationships among maternal perceptions, observations of maternal behavior, and the child's cognitive (verbal) competence within and across time. Data from all three years of the regional longitudinal study are utilized.

Although all subjects participated at all three data collection years, complete data were not available for all subjects. Thus, the number of subjects in the two manuscripts differs slightly.

A general summary of the dissertation research is presented in the final chapter. Suggestions for future research are included in this chapter.

The Appendix contains the Parent-Child Interaction Code Manual which describes the manner in which observations of maternal behaviors were obtained. Discussion of observational methodology as a research technique, as well as the rationale used in the development of the code, are presented in the manual.

References are cited at four points in the dissertation. The references for the literature review and the general summary are presented at the end of the dissertation under Literature Cited. References for the two manuscripts, as well as for the coding manual, immediately follow the presentation of each of the texts and are entitled References Cited.

Authorship for both manuscripts was shared by the doctoral candidate; by Damaris Pease, major professor for the dissertation and leader-in-charge of the Iowa portion of the regional longitudinal project, of which this research was a part; and by Rand D. Conger, minor professor. However, the first author assumes responsibility for accuracy in presentation and interpretation of the data.

### Review of Literature

Historically, research involving the socialization of children has suggested that parents play a significant role in this process, through their interactions with their children and through the environments they create for their children (Baumrind & Black, 1967; Wood & Middleton, 1975). More recently, however, researchers have been interested in the influence of children on parents, as well as in the manner in which parental behaviors and children's competencies are reciprocally related (Maccoby, 1984; Pellegrini, McGillicuddy-DeLisi, Sigel, & Brody, 1986). This perspective suggests that theoretical models are needed that specify both the dynamic nature of parent-child relationships as well as the co-dependencies in the development of parents and children (McGillicuddy-DeLisi, 1985).

Studies of parent-child interaction have utilized a variety of techniques, including self-report and ability tests, to assess both the quality of the parent-child relationship as well as developmental outcomes associated with variations in relationship characteristics. Questions have arisen, however, about the validity of relying solely on

either parental reports (e.g., interviews, questionnaires) or children's outcome measures as assessments of parent-child relationships. For example, it has been suggested that researchers need to focus more attention on interaction processes rather than relying only on children's outcome measures as indicators of effective parenting (Sigel, 1982; Maccoby & Martin, 1983).

Observational studies of parent-child interaction have been employed as a means to avoid the problems associated with a singular reliance on self-report measures and ability tests, as well as a means to focus greater attention on the contributions of both the parent and the child to the interaction situation (Bakeman & Adamson, 1984; Brazelton, Koslowski, & Main, 1974; Maccoby & Martin, 1983).

Researchers have attempted to relate observations of parent-child interaction to various assessments of the child's competence (McGowan & Johnson, 1985; Estrada, Arsenio, Hess, & Holloway, 1987).

A socially oriented theory of the development of cognitive competence has been proposed by Vygotsky (1962, 1978). His theory contrasts with child development conceptual frameworks that imply the causal influence is from parent to child. It also contrasts with the Piagetian view (Piaget, 1983) that cognitive development results primarily from the child's actions on the physical environment and from interaction with peers and minimally from interaction with adults.

Vygotsky's theory of social internalization postulated that cognitive growth results from interaction in the social world. As

children interact in the social environment, they develop language skills to use in regulating their own actions. Central to Vygotsky's theory is the concept of transference from other-regulation to self-regulation. In a joint problem-solving task, for example, a gradual transition from adult to child regulation occurs. First the solution of the problem is adult directed, with the adult assuming most of the responsibility and doing most of the cognitive work. Next, the child and adult share responsibility. Lastly, the child is able to perform the task independently.

Thus, adult-child interaction will vary as a function of the child's competence level. The child moves from an interpsychological to an intrapsychological approach to task solutions. Vygotsky maintained that adults who most effectively match their behavior to the child's zone of proximal development (ability level) will facilitate the child's ability to solve problems independently.

In support of Vygotsky's theory, Brown, Bransford, Ferrara, and Campione (1983) suggested that an appropriate "match" between the parent's and the child's behavior is a key element in promoting positive developmental outcomes for a child. They maintained that much of cognitive development is inherently a social phenomena that depends on effective mediation by others. In parent-child problem-solving interaction, in which the parent serves as the mediator, a transfer of executive control from a parent to a child occurs as the child matures in cognitive abilities. However, the causal influence is not seen as

unidirectional. In effective mediation, children and their mediators influence each other and make mutual adjustments.

Expressing a similar view, Pellegrini (1987) suggested that more directive adult behaviors provide much support for the child (e.g., motivating, praising, giving directions, providing yes/no questions) but do not create a very cognitively demanding environment. Less directive adult behaviors provide less support (i.e., include more open-ended questions and higher-level questions) but encourage children to ask their own questions. Thus, as children become more competent they require less adult direction and are able to deal with more cognitively demanding situations.

In a test of Vygotsky's theory that adults adjust their teaching strategies according to the child's level of communicative competence, Pellegrini, Brody, and Sigel (1985) conducted a study of 120 two-parent families with a child between the age of 42 months and 68 months who was diagnosed as either communication handicapped or noncommunication handicapped. Utilizing observations of parent-child interaction, they found that the parent's cognitive demands and directiveness varied with the communicative status (handicapped vs non-handicapped) of the child. Parents provided more approval and were more directive and less cognitively demanding of communication handicapped children. Parents provided less approval and were less directive and more cognitively demanding with non-handicapped children. In support of Vygotsky's theory, Pellegrini et al. (1985) concluded that the level of support



provided by a parent during interaction with a child during a problem-solving task was an indicator of a child's competence. Viewed from this perspective, one would conclude that in a problem-solving setting the child's developmental level and parental behaviors are reciprocally related, as opposed to a more one-sided perspective that parental reinforcement will determine child performance and capabilities.

In specifying the nature of the relationship between parental behavior and children's problem-solving skills, Brown et al. (1983) pointed out that both emotional affect and directive (instrumental) behaviors must be considered. They pointed out that effective mediation involves a balance between the humanitarian (affective) side (e.g., encouragement to stay on task, joy at the child's accomplishment) and the instrumental side of effective mediation. They maintained that an important outcome of effective mediation may be a more positive attitude toward the general task of learning and problem solving and toward one's self as a learner.

Recent research has supported the view that parental affective behaviors are related to children's competencies. For example, Estrada, Arsenio, Hess, and Holloway (1987), reported longitudinal data on 67 mothers and their children. They found an association between affective quality (as assessed by global ratings) of the mother-child relationship when the child was age 4 and the school-relevant cognitive performance of the child at ages 4, 5, 6, and 12. However, affective ratings were

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not significantly correlated with maternal intelligence, socio-economic status, or child's gender.

Although it has been suggested that maternal directive and maternal affective behaviors are related to children's competence, Zajonc (1980) theorized that affect and cognition are under the control of separate and partially independent psychological systems. In agreement with this view, Maccoby and Martin (1983) noted that the affective and cognitive contents of parental communications may differ somewhat in their impacts upon children. They suggested that the parent's affective reactions (e.g., expressions of likes vs. dislikes, displays of emotion), rather than the cognitive or instrumental content (e.g., quality of information, amount of direction) of their communication, may have the greatest impact on their children. Parental warmth, they posit, may serve as a factor in children's willing acceptance of parental directives.

The task of clarifying the influence of maternal affective and maternal directive behaviors on children's cognitive development has been complicated by lack of distinctive definitions of affective and directive behaviors. For example, the global affect rating used by Estrada et al. (1987) specifically identified affective behavior as including: responsiveness, flexibility, warm concern, acceptance, emotional displays of affect, and punitiveness. However, the instrumental maternal behaviors identified by Pellegrini (1987) included both praising and giving directions.

The lack of specific attention to the possible differential influence of affective and instrumental behaviors also is evident in a study of parental cognitive demands and directiveness by Pellegrini et al. (1985). In this study, parental utterances and the nonverbal behavior that accompanied or followed the utterances were coded as follows: form of utterance (statements vs. questions); verbal emotional support (approval vs. disapproval); nonverbal management and structuring; communication cohesion behavior; and content or mental operational demand. Separate stepwise multiple regression analyses were reported for the two groups of children studied (communication handicapped and non-communication handicapped). The results showed that parental behavior differed more in terms of mental operations and cohesion than in verbal emotional supports, however the researchers did not discuss the differential findings for affective and instrumental behaviors. Their primary conclusion was that parental behavior differed as a function of the child's communication status.

As yet, then, the possible differential influence of instrumental versus affective parental behaviors on the child's cognitive development remains to be tested. As noted earlier, a clearer understanding of parental influence on children's communicative competence may require more detailed research regarding the manner in which maternal instrumental and maternal affective behaviors differ in this process.

Questions also remain regarding the relative contributions of demographic or cultural characteristics (social status variables) to the

relationship between maternal behavior and children's competence.

Although the degree to which parents promoted representational thought was related to the child's cognitive functioning, Sigel (1982) found the frequency and type of parental behavior varied as a function of social and ecological factors as well.

Sigel's findings are consistent with the results of numerous investigations of the relationships among demographic characteristics and parent-child behavioral interaction. In general, it has been suggested that well-educated mothers, compared with less-educated mothers, use more praise, intrude less into their child's activities, and use questions rather than commands in giving instructions (Bee, Van Egeren, Streissguth, Nyman, & Leckie, 1969; Brophy, 1970; Hess & Shipman, 1965). On the other hand, maternal behaviors have been found to be as or more useful than IQ or social-class in predicting child's abilities from maternal characteristics (Hess & Shipman, 1965; 1968).

Although numerous studies of parent-child interaction and child competence have utilized observational methods, a multi-method approach including observational, self-report, and ability test measures would serve to provide greater confidence in the validity of the measures (Lytton, 1971). Furthermore, the need to include assessments of parental beliefs in observational studies of the parent-child relationship, and to investigate the relationships between parental belief structures and the conditions under which belief structures affect behaviors, has been pointed out by Skinner (1985).

In an investigation of the relationship between maternal child-rearing beliefs and maternal interactive behaviors, Skinner (1985) found that SES groups did not differ significantly on any of the maternal behaviors (sensitive and contingent-responsive), however the groups did differ on sensitivity of child-rearing beliefs.

McGowan and Johnson (1985) conducted an investigation using both self-report and observational data in a study of 69 Mexican-American children. Through the use of path analysis they tested causal models incorporating observational assessment of mother-child interaction, home environment, maternal attitudes, and demographic variables as antecedents of verbal and performance IQ at 3 years of age in a study of Mexican-American children. In this study, ratings of various aspects of mother-child interaction were based on 1-minute segments of interaction. Mother's use of reasoning, encouragement of child's verbalization, and level of mother-child interaction were the behaviors assessed. Self-report data regarding maternal education and maternal attitudes regarding child independence and parent-child reciprocity were associated with observed maternal intellectual stimulation of the child. However, the effects of mother's intellectual stimulation on her child's intellectual performance were minimal. Post-hoc analysis of the observational measures of the mother-child relationship revealed that maternal reasoning and mother-child interaction scores were restricted in range.

Ramey, Farran, and Campbell (1979) conducted a longitudinal study involving observations of mother-child interaction in three groups of children (an experimental high-risk group considered to be at risk for intellectual retardation due to socio-cultural factors, a control high-risk group, and a random sample of mother-child dyads). Using multivariate analyses of variance and stepwise multiple regression, they found both high-risk groups to differ from the randomly selected mothers on measures of interaction and attitude. At age 36 months, children's intelligence was predictable from prior maternal behaviors and attitudes, particularly in the control group.

Bee et al. (1982) sought to predict the child's IQ and language skills from a variety of measures, including mother-infant interaction, using a sample of 193 working- and middle-class mother-child dyads in a 4-year longitudinal study. Factor analysis of observations of maternal behavioral scales indicated four clusters: positive messages, negative messages, task facilitation (timing and sensitivity), and instructional techniques (intrusiveness). Based on correlational and regression analyses, the researchers reported that mother-child interaction and general environmental quality were among the best predictors at each age tested and were as good as child's performance in predicting IQ and language at 24 and 36 months.

Madden, O'Hara, and Levenstein (1984) reported on a nine-year experimental mother-child home intervention program using four successive cohorts of low-income families. Based on analyses involving

correlations, analysis of variance and analysis of covariance, they reported no consistent relationships between maternal interaction items and long-term child's IQ, achievement, and school measures. The researchers suggested that the maternal interaction measures used in the study (which included verbal interaction and maternal responsiveness) may have been too simply conceived to capture important relationships.

In summary, a socially oriented view of cognitive development has been proposed by Vygotsky. According to this view, parents and other adults serve as mediators in the cognitive development of children as the children move from regulation by others to regulation by self. Central to this process is the development of language skills for use in regulating one's own behavior. Past research suggests that the affective and the instrumental contents of parental communication are related to a child's competence. However, the differential roles of affect and instrumental communication in this mediation process, as well as the role of social status differences, need further clarification.

Conflicting results have been obtained in studies of the relationships among indicators of maternal behavior (self-report and observational measures) and child competence, as well as between the self-report and observational measures themselves. A need exists for further exploration of the relationship between maternal behavior and child competence.

Specifically, additional research is needed to examine the ways in which maternal emotional affect and maternal instrumental behaviors are

related to children's competence. Assessing maternal behavior and the child's competence using a multi-method approach would assist in clarifying the relationships among and between the variables. Exploring these relationships would yield further information regarding whether or not maternal behavior (specifically maternal affective and instrumental behavior) varies as a function of the child's competence level, as Vygotsky theorizes. The relationship between maternal behavior and child competence suggested by Vygotsky and supported by Pellegrini et al. (1985) may differ depending on the type of maternal behavior studied and/or the social status of the parents and children being studied.

Furthermore, longitudinal data are needed to yield further information about parent-child interaction, child competence, and family social status (Belsky, 1981; Maccoby, 1984; Rogosa, 1979). Including observational measures (Cairns & Green, 1979; Feiring & Lewis, 1978; Pellegrini et al., 1986), as well as self-report and ability tests, in longitudinal studies of parental behavior and the child's competence will provide important information regarding the relationships among these variables over time (Maccoby, 1984; Rogosa, 1979).



**Section I. Observed Maternal Behavior, Child Competence  
and Family Social Status**

**Observed Maternal Behavior, Child Competence  
and Family Social Status**

**Janet N. Melby and Damaris Pease**

**Child Development Department**

**Iowa State University**

**Rand D. Conger**

**College of Family and Consumer Sciences**

**Iowa State University**

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### Abstract

Changes in maternal behavior associated with changes in the age of the child, and the relationships among maternal behavior, child competence and family social status, were the focus of this research. The subjects were 52 Iowa mothers and their 3-year-old first-born children who participated at Yr 1 and Yr 2 in the NC-158 regional longitudinal project (A Study of Parenting Beliefs in Rural and Urban Populations). The Peabody Picture Vocabulary Test-Revised assessed the child's cognitive (receptive verbal) competence. Hollinghead's Four Factor Index of Social Position was used as an indicator of social status. Observations of maternal affective and directive behavior occurring in a video-recorded mother-child problem-solving situation were assessed using the Parent-Child Interaction Code (Positive Affect, Negative Affect, Low Directiveness, Medium Directiveness, High Directiveness, and Off-task Behavior). Inter-observer agreement on the behavioral code was high ( $r = .94$ ). Inter-individual differences in maternal behaviors were relatively stable from Yr 1 to Yr 2, however mean levels of maternal affective and directive behaviors changed across time. By Yr 2 mothers interacted with their children in a more positive and less directive manner. Observed Negative Affect was negatively associated with child competence at Yr 1. Medium Directiveness was positively associated with child competence at Yr 2. Cross-lagged regression analyses indicated that, with the exception of Medium Directiveness, neither the causal influence from child competence to

maternal behavior nor the causal influence from maternal behavior to child competence was statistically significant from Yr 1 to Yr 2. Higher social status was associated with lower Negative Affect at Yr 1 and with higher Positive Affect at Yr 2. At Yr 1 and 2 medium Directiveness was positively correlated with social status. Social status was significantly correlated with the child's PPVT-R score at Yr 2, but not at Yr 1. Maternal behavior did not function as a mediating variable in the relationship between social status and child competence.

### Introduction

The theory of social internalization postulates that cognitive growth in children results from their interaction in the social world (Vygotsky, 1962, 1978). As children interact in the social environment, they develop language skills to use in regulating their own actions. Parents and other adults serve as mediators in this process. In effective mediation, children and their mediators influence each other and make mutual adjustments. In support of this viewpoint, Pellegrini, Brody, and Sigel (1985) found adult-child interaction to vary with the child's level of communicative competence.

Although affective and directive contents of parental communication are related to a child's competence (Brown, Bransford, Ferrera & Campione, 1983; Zajonc, 1980), the differential roles of emotional affect and directive communication in the mediation process need further clarification. Maccoby and Martin (1983) suggested that the parents' affective reactions (e.g., expression of likes vs. dislikes, emotional displays) rather than the cognitive content (e.g., level of directiveness, amount of information) of their communication, may serve as a factor in children's willing acceptance of parental directives. However, the task of clarifying the influence of affective and directive behaviors has been complicated by similarities in the manner in which researchers have defined and discussed these behaviors (e.g., Estrada, Arsenio, Hess, & Holloway, 1987; Pellegrini, Brody, & Sigel, 1985).

Additionally, maternal behavior and the child's competence has been found to vary with social status. In general, well-educated mothers, compared with less-educated mothers, use more praise, intrude less into their child's activities, and used questions rather than commands in giving instructions (Bee, Van Egeren, Strelssguth, Nyman, & Leckie, 1969; Brophy, 1970; Hess & Shipman, 1965; Sigel, 1982). Moreover, maternal behaviors have been found to be as or more useful than social status in predicting children's abilities (Hess & Shipman, 1965, 1968). More recently, Estrada, Arsenio, Hess, and Holloway (1987) found that prior maternal affective behavior was related to child competence, but was not associated with social status. Skinner (1985) reported no differences for SES groups in maternal behaviors (contingent-responsive and sensitive).

Questions remain regarding the relationship between maternal behavior (affective and directive) and the child's competence as well as the relative contributions of social status characteristics to the relationship between maternal behavior and the child's competence, particularly over time (Maccoby, 1984; Rogosa, 1979).

### Purpose

The present investigation explored the relationships among maternal behavior, child's competence, and family social status over time as illustrated in Figure 1. The specific purposes of the present investigation were: (1) to examine changes in maternal behavior (affective and directive) over time, (2) to explore the relationships between maternal behavior (affective and directive) and child's competence within and across time, (3) to investigate whether or not maternal behavior (affective and directive) functioned as a mediator in the relationship between family social status and the child's competence.

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Insert Figure 1 about here  
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Maternal behavior was defined as verbal and nonverbal affective and directive acts elicited during mother-child interaction sessions involving a standardized problem-solving situation. For purposes of the present investigation, affective behaviors were defined as displays of likes vs. dislikes and emotional expressions. Directive behaviors were defined as instrumental behaviors that provided information and facilitated action. The child's competence was defined as performance on the Peabody Picture Vocabulary Test (Dunn, 1981). Family social status was identified by the Four Factor Index of Social Position (Hollingshead, 1975).

If inter-individual differences in maternal behavior are relatively stable across time, yet mean levels of maternal affective and directive behaviors change across time, parental behavioral changes would be associated with changes in the child's developmental level (e.g., an increase in the child's age), offering support for Vygotsky's theory (Vygotsky, 1962, 1978).

By assessing two domains of maternal behavior, affective and directive, it becomes possible to test whether the affective and directive content of maternal behaviors influence children differently, as suggested by Maccoby and Martin (1983).

Although relationships have been found between maternal behavior and socio-economic status (Brophy, 1970; Hess & Shipman, 1965), maternal behaviors also predict child's abilities (Hess & Shipman, 1965; 1968). If maternal behavior is a mediating variable between family social status and child competence, the child's competence would vary as a function of maternal behavior and family social status, and the effects of social status on child competence would be reduced when maternal behavior was included in a regression equation (Baron & Kenny, 1986).



## Method

### Subjects

The subjects were 52 Iowa mothers and their first-born 3-year-old children who participated in the first two years of a regional longitudinal study conducted during 1982-1985 (Lawton, Colman, Boger, Pease, Galejs, Looney, & Poresky, 1983). Iowa families with a 3-year-old first-born child were identified from newspaper birth records; only two-parent families were recruited. Half of the families were from an urban environment, while the other half lived either on farms or in small towns with a population less than 2,500 located outside a 50-mile radius of a standard metropolitan statistical area (SMSA). Of the children, 35 were female and 17 were male. At data collection Yr 1, median age of mothers was 27 years (range: 21-37 years); median age of fathers was 29 years (range: 24-39 years). Median number of years of education completed was 14 years for both parents (range: 12-18 years for mothers, 12-22 years for fathers). All of the fathers were employed outside the home; 34 (65.4%) of the mothers were employed outside the home.

The Four Factor Index of Social Status (Hollingshead, 1975) was used to code occupation. The occupational status for fathers ranged from 1 (menial service workers) to 9 (higher executives, major professionals), with a median of 6 (technicians, semiprofessionals). For the employed mothers, occupational status ranged from 3 (machine

operators, semiskilled workers) to 8 (administrators, lesser professionals), with a median of 6.

Measures

The measures used to investigate relationships among child's competence, maternal behavior, and family social status were selected from a battery of instruments administered as part of the regional longitudinal study.

Peabody Picture Vocabulary Test-Revised. The Peabody Picture Vocabulary Test-Revised (PPVT-R) measures the child's cognitive (receptive verbal) ability and has demonstrated reliability and validity (Dunn, 1981).

Parent-Child Interaction Code. The Parent-Child Interaction Code (Melby, 1988) assesses maternal affective behavior and maternal instrumental (directive) behaviors. The code contains 18 verbal and nonverbal behavioral descriptors which can be collapsed into six categories (see Table 1) to yield information on type of maternal affective behavior (positive and negative) and level of maternal directiveness (low, medium, and high), as well as amount of off-task behaviors displayed by the mothers in an interaction situation.

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Insert Table 1 about here  
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Development of the Parent-Child Interaction Code, including definition of the 18 behavioral descriptors and the six categories is

based on research regarding mother-child interaction (Bee et al., 1982; Conger, Brainerd, Birch, Friedberg, & Navarro, 1986; Hess and Shipman, 1965; McGillicuddy-DeLisi, 1985; Skinner, 1985). Reliability of the code for the present investigation is reported in the results section. Positive Affect includes behaviors that indicate acceptance, approval, support, affirmation and favorable acknowledgement. Negative Affect includes behaviors that indicate disapproval, rejection, disagreement, criticism, unfavorable acknowledgement, and emotional appeals. Low Directiveness includes watching the child manipulate puzzle pieces, pausing, and providing information but not actively intervening in the child's activities. Medium Directiveness includes mutual involvement in manipulating puzzle pieces and asking questions to suggest a course of action. High Directiveness includes pointing toward a particular puzzle piece, actually moving the child's hand, manipulating puzzle pieces while the child watched, and telling the child what to do. Off-task Behavior includes verbal and nonverbal behaviors that do not contribute to the solution of the puzzle.

Four Factor Index of Social Position. The Four Factor Index of Social Status (Hollingshead, 1975) incorporates parent's education, occupation, gender, and marital status in a single measure of family social status. This single indicator has proven useful as a summary measure of demographic characteristics that may influence maternal behavior and child competence (Gottfried, 1985).

### Procedures

Data collection. Data were collected at two points in time, approximately one year apart. Local county extension facilities served as data collection sites. Each family participated individually in a scheduled session which lasted for approximately one hour. During the first part of the session, parents independently responded to a series of self-report questionnaires while assessments of the child (including the PPVT-R) were obtained by one of the examiners. Subsequent to the completion of these measures, the mother-child dyad participated in a problem-solving task which was video recorded.

Problem-solving task. Observation of maternal behavior was based on the interaction of mothers with their children during participation in a problem-solving puzzle task. Mother-child dyads were asked to complete a lucite puzzle consisting of three circles and three triangles, each with 3 holes corresponding to one of six groups of pegs arranged on the puzzle base (Kontos, 1980). Each shape fit onto the pegs in only 1 of 36 possible ways. Puzzle solution is difficult, but not impossible, for preschool-age children. The mother-child dyad was told that the puzzle was "something to do together" and instructed to try to finish the puzzle in 15 minutes. The session was terminated when the puzzle was solved or at the end of 15-minutes, whichever occurred first.

Behavioral coding. Because the length of time to complete the puzzle task varied from dyad to dyad, the initial 4-minutes of the

video-recorded sessions were selected as the portion of interaction for observation of maternal behavior. Although brief, this time period has been useful in identifying interactional differences (Brazelton, Koslowski, & Main, 1974; Cooper, Grotevant, & Condon, 1982; Pellegrini et al., 1985, 1986).

The Parent-Child Interaction Code (Melby, 1988) was used to code maternal behaviors. All video-recorded sessions were independently coded by two observers, thus reducing the possibility of bias occurring in coding repeated measures on the same dyads. Order of observation of video tapes was randomized across dyads and across the two years. All behavioral coding was done using time-dubbed video tapes. To aid in unitization of behavior, the first observer transcribed the verbalizations of the mother, noted the on-set time (in seconds) of verbal behavior changes and, in the absence of verbal behaviors, the on-set time of non-verbal behavior changes. The first observer then assigned one of the 18 behavioral descriptors to each change in behavior. The second observer used the prepared transcripts (verbalizations and on-set times, but not behavioral descriptors) to code maternal behavior changes.

Frequency and duration of maternal behaviors were obtained using a computer program developed by Conger and Sung (1988).

Computation of agreement and reliability. Methods used in assessing interobserver reliability were based on those suggested by Hartmann (1977).

Effective percent agreement for the six behavioral categories derived from the 18 behavioral descriptor (frequencies and durations) were obtained from the transcripts coded by the two observers using a computer program developed by Conger and Sung (1988). The program also yielded a kappa score for the combined behavioral categories for each observational session, yielding 104 sets of observations (52 mother-child dyads each of two years). The frequency and duration information for each observation session was compiled into a single data set and Pearson Product-Moment correlations between the two observer's scores were obtained.

The mean kappa coefficient across all 104 observation sessions for all mothers and all six behavior categories was .86 (see Table 2), well within the range of acceptable values (Bakeman & Adamson, 1984; Hartmann, 1977). The correlations between the session scores of the two observers, based on one score for each behavioral category for each of the 104 sessions for each observer, ranged from .89 to .98 with a mean of .94 (see Table 2). Effective percent agreement (EPA) for the six categories ranged from .67 to .84. Because effective percent agreement was calculated on a second-by-second basis, the EPA statistic is reported only for the duration measures. These findings suggest the presence of basic agreement in observational coding by the two observers (Hartmann, 1977).

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Insert Table 2 about here  
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### Statistical Treatment

Pooled scores. Based upon Hartmann's (1977) suggestion that pooled observers' scores are more reliable than the scores from a single observer, and in light of basic agreement in observational coding by the two observers, subsequent data analyses were based on the average of the two observer's scores for each of the behavioral categories.

Data transformations. Because rates of behaviors varied across observation sessions, frequencies and durations of maternal behavior were transformed prior to further analyses.

Transformation of frequencies involved obtaining behavioral proportions by dividing a given behavioral category by the total of all behaviors. Then, to correct for skewness in the proportions, the original proportions were transformed in scale using the formula:  $X' = 2 \text{ arc sine} * \text{square root of } X$ , where  $X$  is a proportion of behavior (Winer, 1971).

The use of a 4-minute interval (240 seconds) for all subjects essentially yielded proportions of behaviors for the duration measures. However, because the standard deviations of the duration categories varied directly with the means, the duration measures were transformed using the formula:  $X' = \text{Log} ( X + 1 )$ , where  $X$  is a duration of behavior (Snedecor & Cochran, 1980) and where 1 is added across all categories to

account for instances of nonoccurrence of behavior in particular categories for some of the mothers.

The within-year observational comparisons were ipsative since the amount of behavior in one category restricted the amount of behavior in another category. Thus, the within-year correlations were not amenable to tests of statistical significance. The ipsativity of the within-year comparisons contributed to negative correlations of observational measures. Conversely, positive correlations represented probable true associations.

Statistical tests. Paired comparison t-tests were used to test the significance of changes occurring in the six maternal behavior categories between Yr 1 and Yr 2. Consistent with Nunnally's (1982) discussion regarding analysis of longitudinal data, Pearson Product-Moment correlations were used to examine the relationships among variables within each year and across the two years. Despite the small sample size, multiple regression analyses were used in testing whether child competence at Yr 2 was influenced by maternal behavior at Yr 1, controlling for child competence at Yr 1, and whether maternal behavior at Yr 2 was influenced by child competence at Yr 1, controlling for maternal behavior at Yr 1 (i.e., a 2-wave-2-variable panel design) (Rogosa, 1979). Additional regression analyses using family social status as a main effect and as an interaction term in combination with each of the other predictors, also were performed. One-tailed tests of



statistical significance were employed in making inferences from the data.

## Results

### Stability and Change in Maternal Behaviors

Across-year, within-variable correlations. Pearson Product-Moment correlations were employed to investigate the stability of maternal behavior across the two years (see Table 3).

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Insert Table 3 about here

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All correlations involving frequency of maternal directive behavior (Low Directiveness, Medium Directiveness, and High Directiveness) were statistically significant ( $r = .31, p < .025$ ;  $r = .53, p < .005$ ;  $r = .37, p < .005$ , respectively). For durations, only Low Directiveness and Medium Directiveness were statistically significant ( $r = .24, p < .05$ ;  $r = .36, p < .005$ , respectively).

The between year correlations for Positive Affect were statistically significant for frequency ( $r = .23, p < .05$ ) and duration ( $r = .31, p < .025$ ). The correlations for Negative Affect were statistically significant for duration ( $r = .23, p < .05$ ) but not for frequency.

The frequency measure of Off-task Behavior, but not the duration measure, was statistically significant ( $r = .24, p < .05$ ).

In general, correlations involving durations of maternal affective behavior were of a larger magnitude than correlations involving

frequencies, whereas for maternal directive behaviors, correlations involving frequencies were larger than correlations involving durations.

Across-year, within-variable t-tests. The direction and significance of changes in maternal behavior between Yr 1 and Yr 2 were investigated through paired comparison  $t$ -tests. The change scores used in the paired comparison  $t$ -tests were calculated by subtracting the Yr 1 score from the Yr 2 score for each of the six behavior categories for frequencies and durations (see Table 4).

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 Insert Table 4 about here  
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By Yr 2 mothers interacted in a less directive manner with their children (the measures of Low Directiveness increased significantly:  $t = 2.52$ ,  $p < .005$ , frequency;  $t = 2.12$ ,  $p < .025$ , duration). There was also a decrease in frequency ( $t = -2.84$ ,  $p < .005$ ) of Medium Directiveness. Statistically significant decreases also occurred in the frequency ( $t = -3.08$ ,  $p < .005$ ) and duration ( $t = -3.26$ ,  $p < .005$ ) of Off-task Behavior. Frequency, but not duration, of Positive Affect increased ( $t = 1.65$ ,  $p < .05$ ) and duration, but not frequency, of Negative Affect decreased ( $t = -1.67$ ,  $p < .05$ ). In general, as the children became older, these mothers were involved in the task in a less directive and more positive manner.

Reciprocal Influence Between Maternal Behaviors and Child Competence

Within-year, across-variable correlations for Yr 1. Pearson

Product-Moment correlations among the measures of child competence and maternal behavior are presented in Table 5. The frequency and duration measures of Negative Affect, but not Positive Affect, were significantly correlated with the child's PPVT-R score ( $r = -.24, p < .05$ ;  $r = -.25, p < .025$ , respectively).

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Insert Table 5 about here

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No statistically significant relationships were found between the Yr 1 maternal directive behaviors (Low Directiveness, Medium Directiveness, High Directiveness) or maternal Off-task Behavior and the child's PPVT-R score.

Positive Affect was positively associated with frequency of Low Directiveness ( $r = .26, p < .05$ ) and duration of Medium Directiveness ( $r = .27, p = .05$ ) and negatively associated with frequency of High Directiveness ( $r = .25, p < .05$ ). In general, more positive maternal affective behavior was associated with lower maternal directiveness, however only negative maternal affective behavior was associated with the child's PPVT-R score.

Although ipsative in nature, relationships also were evident between the maternal affective and directive behaviors. A higher frequency of Positive Affect was associated with a higher frequency of

Low Directiveness ( $r = .25$ ,  $p < .05$ ), lower frequency of High Directiveness ( $r = -.25$ ,  $p < .05$ ), and lower frequency of Off-task Behaviors ( $r = -.36$ ,  $p < .005$ ). Negative Affect was negatively associated with Medium Directiveness ( $r = -.23$ ,  $p < .05$ , frequency) and Off-task Behavior ( $r = -.36$ ,  $p < .005$ , frequency;  $r = .23$ ,  $p < .05$ , duration).

Within-year, across-variable correlations for Yr 2. Within-year Pearson-Product-Moment correlations for maternal behavior and the child's competence at Yr 2 are presented in Table 6. In general, the correlations between the maternal affective measures and the child's PPVT-R score for Yr 2 are in the same direction as the findings for Yr 1, but not statistically significant.

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 Insert Table 6 about here  
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The correlations for frequency of Medium Directiveness and PPVT-R for Yr 2 were positive and statistically significant ( $r = .27$ ,  $p < .025$ ). Consistent with the finding for Yr 1, no statistically significant relationships were found between Yr 2 maternal Low Directiveness, High Directive, or Off-task Behavior and the child's PPVT-R score.

Although ipsative in nature, relationships were also evident between the maternal affective and directive behaviors at Yr 2. Increased maternal Negative Affect was associated with decreased Low Directiveness ( $r = -.26$ ,  $p < .05$ , frequency;  $r = -.35$ ,  $p < .005$ , duration). Negative Affect correlated positively with duration but not frequency of

Medium Directiveness ( $r = .29, p < .05$ ). Negative Affect was negatively associated with frequency of Off-task Behavior ( $r = -.27, p < .025$ ).

Across-year, across-variable correlations for maternal Behaviors and child's competence. Pearson Product-Moment correlations were used in examining the relationships among maternal behavior and child competence variables across time (see Table 7).

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 Insert Table 7 about here  
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The child's PPVT-R score at Yr 2 was negatively predicted by Negative Affect ( $r = -.25, p < .05$ ). No other Yr 1 maternal behaviors were statistically significant in predicting the child's Yr 2 PPVT-R score.

Relationships also were evident among the maternal affective and directiveness measures across the two years. Positive Affect at Yr 2 was negatively predicted by duration of maternal Low Directiveness ( $r = -.29, p < .025$ ) and positively predicted by Medium Directiveness ( $r = .29, p < .025$ , frequency;  $r = .30, p < .025$ , duration) at Yr 1. Low Directiveness at Yr 2 was negatively predicted by Medium Directiveness at Yr 1 ( $r = -.29, p < .025$ , duration). No other Yr 1 variables predicted Yr 2 Low Directiveness. There was an association between Medium Directiveness at Yr 2 and Yr 1 Negative Affect ( $r = -.32, p < .025$ , frequency;  $r = -.27, p < .05$ , duration). High Directiveness at Yr 2 was negatively associated with Yr 1 Positive Affect ( $r = -.27, p < .025$ ,

duration). In general, the findings suggested that the less negative the mother was at Yr 1, the more likely she was to exhibit relatively less directive behavior at Yr 2.

Regression analyses. The reciprocal influence of maternal behaviors and child competence across the two years was investigated using a series of structural regression equations in a 2-wave-2-variable (2W2V) panel design (Rogosa, 1979). In each instance, one of the six categories of maternal behavior (Yr 1) and the child's PPVT-R score (Yr 1) were included in the regression equations predicting Yr 2 maternal behavior or the child's Yr 2 PPVT-R score.

When measures of maternal affective behavior were entered into the regression equations, the stability of the PPVT-R across the two years was relatively high, regardless of whether frequency or duration of maternal behavior was used ( $b = .67$ ,  $p < .005$ , frequency;  $b = .65$ ,  $p < .005$ , duration). When prior PPVT-R score was entered into the regression equation, the stability of Positive Affect was statistically significant for frequency ( $b = .23$ ,  $p < .05$ ) and duration ( $b = .30$ ,  $p < .025$ ). Neither duration nor frequency of Negative Affect was stable across the two years. No statistically significant cross-lagged causal trends were evident for the maternal affective behaviors.

The results of structural regression equations using one of the measures of maternal directiveness (Low Directiveness, Medium Directiveness, or High Directiveness) with the child's PPVT-R scores indicated that PPVT-R scores were relatively stable (ranged from  $b =$

.65, to  $b = .67$ ,  $p < .005$  respectively). The regression coefficients for maternal directiveness measures were statistically significant for Low Directiveness ( $b = .31$ ,  $p < .025$ , frequency;  $b = .23$ ,  $p < .05$ , duration), for Medium Directiveness ( $b = .54$ ,  $p < .005$ , frequency;  $b = .37$ ,  $p < .005$ , duration), and for frequency of High Directiveness ( $b = .35$ ,  $p = .025$ ). The cross-lagged regression coefficients suggested that frequency of Yr 1 Medium Directiveness was related to the child's Yr 2 PPVT- R score ( $b = .20$ ,  $p < .05$ ), however, this was the only statistically significant cross-lagged coefficient obtained for the maternal directiveness measures.

Relationship of Family Social Status to Maternal Behaviors and Child's Competence

Correlation of maternal behavior and child's competence at Yr 1 with family social status at Yr 1. Family social status and frequency (but not duration) of maternal Negative Affect were negatively correlated at Yr 1 ( $r = -.27$ ,  $p < .025$ , frequency), suggesting that mothers in families with higher social status were less likely than mothers in families with lower social status to exhibit negative maternal behaviors (see Table 8).

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Insert Table 8 about here

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The positive relationship between family social status and maternal Medium Directiveness ( $r = .30$ ,  $p < .025$ , frequency;  $r = .33$ ,  $p < .005$ ,



duration) suggested that mothers in families with higher social status were more likely than mothers in families with lower social status to display a medium level of directiveness. No statistically significant relationships existed between family social status and the other maternal directiveness categories.

The relationship between family social status and the child's PPVT-R score was not statistically significant at Yr 1.

Correlation of maternal behavior and child competence at Yr 2 with family social status at Yr 1. Family social status at Yr 1 was positively correlated with Yr 2 maternal Positive Affect ( $r = .38$ ,  $p < .005$ , frequency;  $r = .38$ ,  $p < .005$ , duration) (see Table 8). However, Yr 1 family social status was not significantly correlated with maternal Negative Affect at Yr 2. Whereas the Yr 1 results suggested that higher family social status was associated with lower negative behaviors, the Yr 2 results suggested that higher family social status predicted higher positive behaviors, but not with fewer negative behaviors, at Yr 2.

The Yr 2 findings paralleled the Yr 1 trends for the correlations between family social status and the maternal directiveness measures. The correlations between Yr 1 family social status and Yr 2 Medium Directiveness were positive and statistically significant ( $r = .33$ ,  $p < .005$ , frequency;  $r = .30$ ,  $p < .025$ , duration). No statistically significant relationships existed between family social status and maternal Low Directiveness, or High Directiveness.

In contrast to the correlation with the child's Yr 1 PPVT-R score, family social status at Yr 1 was significantly correlated with the child's PPVT-R score at Yr 2 ( $r = .33$ ,  $p < .025$ ).

Regression analyses. A series of regression equations was obtained in which the family social status was entered as a predictor into the previously reported 2-wave-2-variable (2W2V) equations in order to investigate the contributions of family social status to the reciprocal influence of maternal behaviors and child competence across the two years. In each instance, one of the six categories of maternal behavior (Yr 1), the children's PPVT-R scores (Yr 1), and family social status (Yr 1) were included in the regression equations predicting either maternal behavior or the child's PPVT-R score at Yr 2.

In all regression equations predicting the child's Yr 2 PPVT-R score from the child's Yr 1 PPVT-R score and Yr 1 maternal behavior, controlling for family social status, the contribution of family social status was statistically significant except for the equations including Medium Directiveness. In each regression equation in which family social status was significant, the contributions of family social status were larger than the contributions of maternal behavior, but not as large as the contributions of the child's prior competence. Thus, except for Medium Directiveness, when child's PPVT-R score, maternal behavior, and family social status were included in the regression equations, family social status contributed significantly to the variance in the child's Yr 2 PPVT-R score.

In the regression equations predicting Yr 2 maternal behavior from Yr 1 PPVT-R score, Yr 1 maternal behavior, and family social status, the contribution of family social status was significant in three of the equations. These included equations predicting Yr 2 Positive Affect (frequency and duration) and Off-task Behavior (frequency). In each of these equations, family social status contributed more to the model than the child's prior PPVT-R score or the mother's prior behavior.

When the interaction of family social status and Yr 1 maternal behavior was entered into the regression equations, the interaction term was significant only in the equation predicting the child's Yr 2 PPVT-R score using the interaction of social status and frequency of Yr 1 Low Directiveness ( $b = -1.27$ ,  $p < .025$ ,  $R = .54$ ,  $Adj R = .50$ ). Thus, maternal behavior did not appear to be a moderating variable in the relationship between family social status and the child's competence. Moreover, the contributions of the interaction of family status and child's PPVT-R score were not significant in any of the models predicting Yr 2 maternal behavior.

### Summary

The presence of high inter-observer agreement on the behavioral code suggested that maternal behaviors were reliably measured within each year.

Inter-individual differences in maternal behaviors were relatively stable across time, yet mean levels of maternal affective and directive behaviors changed across time and were associated with changes in the age of the child (from 3 to 4 years of age). As anticipated, decreases occurred in duration of Negative Affect and in frequency and duration of Medium Directiveness and Off-task Behavior. Increases occurred in frequency of Positive Affect and in frequency and duration of Low Directiveness. A slight increase in frequency, but not duration, of High Directiveness also occurred. In general, these findings were consistent with Vygotsky's theory (1962, 1978) that as children increase in their ability to solve problems independently (associated here with an increase in age), the adult assumes a less directive role in the problem-solving situation.

In the present investigation, maternal Negative Affect was negatively associated with the child's competence at Yr 1, whereas Medium Directiveness was positively associated with the child's competence at Yr 2.

The across-year correlational findings indicated that duration of Negative Affect at Yr 1 was negatively associated with the child's PPVT-R score at Yr 2. However, maternal directiveness behaviors at Yr 1

did not predict the child's PPVT-R score at Yr 2. The differential findings for the maternal affective and directive measures lends support to the contention by Maccoby and Martin (1983) that affective and directive behaviors may differ somewhat in their impact on children.

The results for Negative Affect are consistent with the findings by Estrada et al. (1987) that affective quality of the mother-child relationship correlated with child's mental ability. The findings for Medium Directiveness at Yr 2 were somewhat consistent with Vygotsky's theory that the level of parental directiveness may be an indicator of the child's competence (Pellegrini et al., 1985).

Relationships existed between maternal affective and directive behaviors within each year. In general, at Yr 1 Positive Affect was positively associated with Low Directiveness and Medium Directiveness and negatively associated with High Directiveness and Off-task Behavior. Negative Affect at Yr 1 was negatively associated with Medium Directiveness and Off-task Behavior. At Yr 2, Negative Affect was negatively associated with Low Directiveness and Off-task Behavior.

For all cross-lagged regression analyses, the within-variable effects (from prior child competence to later child competence, and from prior maternal behavior to later maternal behavior) were statistically significant. However, with the exception of Medium Directiveness, neither child competence nor maternal behavior had a causal influence from Yr 1 to Yr 2. For Medium Directiveness, the causal direction from maternal behavior to child competence was statistically significant.

If a medium level of directiveness is an appropriate level for parent-child interaction when children are 3 and 4 years old, the regression results added some support to the notions that an appropriate match between parent and child behaviors may facilitate growth in the child's competence (Vygotsky 1962, 1978) and that parents who are relatively less directive may stimulate greater cognitive growth on the part of the child (Sigel, 1982).

Family social status was related to maternal behaviors, however the relationships differed slightly over time and for the particular behaviors addressed. For Yr 1, higher family social status was associated with lower Negative Affect, whereas for Yr 2, higher family social status was associated with higher Positive Affect. Maternal Medium Directiveness was significantly and positively correlated with family social status for both Yr 1 and Yr 2. However, no statistically significant relationships existed between family social status and Low Directiveness, High Directiveness, or Off-task Behavior for either Yr 1 or Yr 2.

The relationship between Yr 1 family social status and child competence was not statistically significant at Yr 1, however family social status at Yr 1 positively predicted child's PPVT-R score at Yr 2. Maternal Positive Affect and Medium Directiveness at Yr 2 were also predicted by family social status at Yr 1.

Regression analyses indicated that maternal behavior did not function as a mediator in the relationships within each year between

family social status and the child's competence. Furthermore, family social status contributed significantly to the prediction of the child's Yr 2 PPVT-R score for all regression equations except those including maternal medium-directive behavior. The contributions of family social status were consistently of a larger magnitude than the contributions of maternal behavior. In the models predicting maternal behavior, family social status contributed significantly to the explanation of two maternal behaviors (Positive Affect and Off-task Behaviors) at Yr 2. Adding the interaction terms to the prediction equations significantly contributed to the regression equations predicting Yr 2 PPVT-R score using the interaction of family social status with maternal Low Directiveness and Off-task Behavior.

Correlation and regression coefficients of the child's PPVT-R scores across time were of a larger magnitude than the coefficients for each of the categories of observed maternal behaviors. However, the fact that 9 out of 12 across-year, within-category correlations of maternal behaviors were statistically significant is noteworthy. Cairns and Green (1979) pointed out that the correlations of observed individual differences across contexts and relationships typically ranges between  $r = .30$  and  $r = .00$ . Furthermore, they suggested that observations generally capture only a modest amount of stable individual difference variance.

The findings obtained using frequency and duration measures were not consistent across all analyses, suggesting the lack of clear

evidence regarding which is the more appropriate measure. Conclusions based on one measure may differ somewhat from conclusions based on the other measure. Considering both frequency and duration measures may provide a more accurate assessment of behavior than relying on only one type of measure. Researchers using observational assessments of interaction need to be sensitive to the varying results that may be obtained with the two approaches to describing behaviors. Using a mean duration measure (duration divided by frequency) may be a way to assess the intensity of observed behaviors and may overcome some of the discrepancies found when comparing results obtained with frequency and duration measures.

The relationships among the variables and the conclusions regarding these relationships differ somewhat from Yr 1 to Yr 2. It is unclear whether these differences are the result of changes in the parent and/or child, a lack of sensitive measurement procedures, or due to other factors, such as the use of a four-minute interval of observed behavior. The reality of inconsistent results for the two years reinforces the need for longitudinal research to examine relationships among family social status, parental behaviors, and child competence within and between years (Maccoby, 1984; Rogosa, 1979).

Additional research is needed to explore the relationship of maternal behavior and family social status to the child's competence over a larger time interval to determine whether or not the relationship trends would become stronger. Including other assessments of the



child's competence would yield further information regarding the relationships among family social status, maternal behavior, and child competence. Research that included assessments of maternal competence, attitudes, and self-report behaviors would yield insight into the manner in which the mother's competence and the mother's perceptions of herself and of her child may be related to family social status, maternal behavior, and the child's competence.

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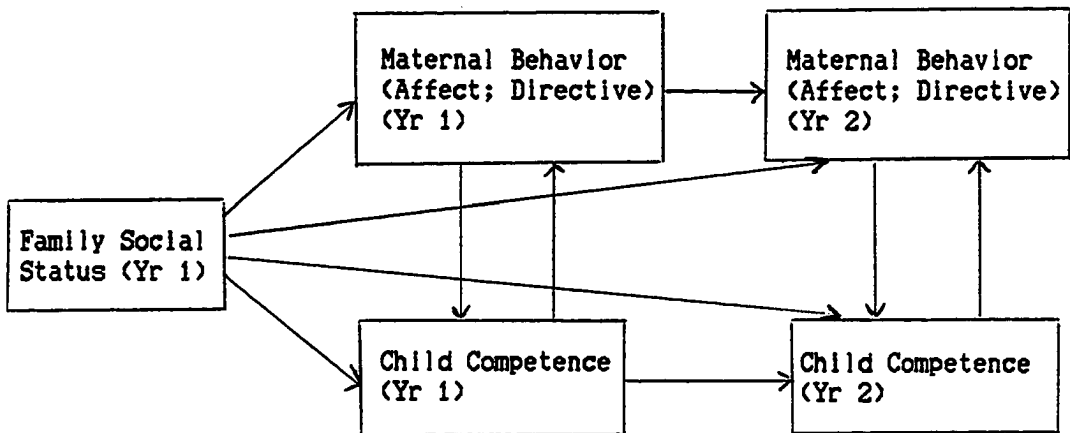


Figure 1. The relationship of maternal behavior, child's competence and family social status over time.

Table 1

Maternal Behavior Categories and Associated Verbal and Nonverbal Behavioral Descriptors of the Parent-Child Interaction Code

Maternal behavior category	Behavioral descriptors	
	Verbal	Nonverbal
Positive Affect	Favorable (e.g., praise, support)	Accept (e.g., hug, smile)
Negative Affect	Unfavorable (e.g., criticism, disagreement) Dependency bid	Reject (e.g., shake head, push)
Low Directiveness	Statement of information	On-looking Other task-related behavior (e.g., pause, listen)
Medium Directiveness	Question/suggestion Inquiry/information-seeking	Mutual involvement
High Directiveness	Command	Structure (e.g., point, show) Intrude Take-over
Off-task Behavior	Ambiguous utterance (e.g., blurb, fragment) Off-task utterance	Off-task nonverbal behavior

Table 2

Inter-observer Agreement (Correlations and Effective Percent Agreement) for Maternal Behavior Categories (Yr 1 and Yr 2) (n=52)

Maternal behavior category	Inter-observer agreement							
	Yr 1				Yr 2			
	Frequency		Duration		Frequency		Duration	
	$r$	EPA	$r$	EPA	$r$	EPA	$r$	EPA
Positive Affect	.86	--	.82	.75	.91	--	.91	.81
Negative Affect	.92	--	.91	.82	.97	--	.90	.86
Low Directiveness	.93	--	.97	.80	.92	--	.90	.84
Medium Directiveness	.94	--	.96	.84	.98	--	.96	.84
High Directiveness	.95	--	.94	.83	.95	--	.81	.83
Off-task Behavior	.98	--	.98	.67	.99	--	.98	.73

Note 1. Kappa Yr 1 = .86; Kappa Yr 2 = .87.

Note 2. Over-all means: frequency  $r$  = .94; duration  $r$  = .93, EPA = .84

Note 3. Effective Percent Agreement (EPA) was computed on a second-by-second basis and, thus, is reported only for duration measures.



Table 3

Between Year Correlations for the Maternal Behavior  
Categories (n= 52)

	Frequency	Duration
<u>Maternal behavior categories</u>		
Positive Affect	.23*	.31**
Negative Affect	.15	.23*
Low Directiveness	.31**	.24*
Medium Directiveness	.53***	.36***
High Directiveness	.37***	.21
Off-task Behavior	.24*	.18

\* $p < .05$ , one-tail. \*\* $p < .025$ , one-tail.  
\*\*\* $p < .005$ , one-tail.

Table 4

Paired Comparison Results (Means, Standard Deviations, t-tests)  
for Maternal Behavior Changes from Yr 1 to Yr 2 (Frequencies and  
Durations) (n=52)

	X	SD	t
<b>Maternal behavior category</b>			
<b>Positive Affect</b>			
Frequency	.04	.02	1.65*
Duration	.07	.09	.76
<b>Negative Affect</b>			
Frequency	.01	.03	.22
Duration	-.13	.08	-1.67*
<b>Low Directiveness</b>			
Frequency	.08	.03	2.52***
Duration	.15	.07	2.12**
<b>Medium Directiveness</b>			
Frequency	-.07	.02	-2.84***
Duration	-.12	.08	-1.42
<b>High Directiveness</b>			
Frequency	.05	.02	1.81*
Duration	.04	.05	.85
<b>Off-task Behavior</b>			
Frequency	-.15	.05	-3.08***
Duration	-.54	.16	-3.26***

\*p < .05, one-tail. \*\*p < .025, one-tail. \*\*\*p < .005, one-tail.

Table 5

Pearson Product-Moment Correlations, Means, and Standard Deviations for Yr 1 Variables (Frequencies Above and Durations Below the Diagonal) (n = 52)

Yr 1 Variables	Yr 1 Variables			
	(1)	(2)	(3)	(4)
(1) PPVT-R		.02	-.24*	-.02
(2) Positive Affect	.08		-.02	.26*
(3) Negative Affect	-.25*	.06		-.08
(4) Low Directiveness	-.04	.06	-.18	
(5) Med. Directiveness	-.13	.27**	-.06	-.18
(6) High Directiveness	-.16	-.12	.15	-.44***
(7) Off-task Behavior	.13	-.17	-.23*	-.51***
X	29.08	2.41	3.07	4.25
SD	13.21	.55	.44	.40
Minimum	7	.92	1.10	3.16
Maximum	58	3.38	3.86	5.07

Note. Frequencies are based on proportions transformed by arc sine transformation. Durations are based on log transformations.

\* $p < .05$ , one-tail. \*\* $p < .025$ , one-tail. \*\*\* $p < .005$ , one-tail.

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(5)	(6)	(7)	X	SD	Minimum	Maximum
-.09	-.18	.21	29.08	13.20	7.00	58.00
.21	-.25*	-.36***	.50	.13	.22	.78
-.23*	.22	-.36***	.70	.13	.23	.95
-.03	-.29**	-.52***	1.01	.19	.59	1.49
	-.29**	-.24*	.79	.16	.38	1.10
-.18		-.36**	1.17	.17	.79	1.68
-.19	-.03		.63	.32	.00	1.53
3.51	4.23	2.82				
.45	.31	.97				
2.30	3.33	.00				
4.36	4.82	4.62				

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Table 6

Pearson Product-Moment Correlations, Means, and Standard Deviations for Yr 2 Variables (Frequencies Above and Durations Below the Diagonal) ( $n = 52$ )

Yr 2 Variables	Yr 2 Variables			
	(1)	(2)	(3)	(4)
(1) PPVT-R		.08	-.16	.00
(2) Positive Affect	.02		-.18	-.05
(3) Negative Affect	-.19	-.01		-.26*
(4) Low Directiveness	.00	-.20	-.35***	
(5) Med. Directiveness	.14	.02	.29**	-.56***
(6) High Directiveness	-.20	-.10	.10	-.47***
(7) Off-Task Behavior	-.03	.11	.02	-.43***
X	47.02	2.48	2.94	4.40
SD	11.89	.55	.49	.41
Minimum	18	.69	1.39	3.46
Maximum	71	3.50	3.70	5.05

Note. Frequencies are based on proportions transformed by arc sine transformation. Durations are based on log transformations.

\* $p < .05$ , one-tail. \*\* $p < .025$ , one-tail. \*\*\* $p < .005$ , one-tail.

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(5)	(6)	(7)	X	SD	Minimum	Maximum
.27**	-.18	-.02	47.02	11.89	18.00	71.00
-.02	-.14	-.03	.54	.12	.18	.78
.08	-.03	-.27**	.70	.15	.38	1.02
-.39***	-.29**	-.40***	1.09	.20	.64	1.10
	-.41***	-.03	.72	.19	.38	1.15
-.13		-.20	1.22	.15	.88	1.58
.08	-.01		.48	.23	.00	1.38
3.39	4.27	2.28				
.61	.27	.88				
1.94	3.57	.00				
4.50	4.85	1.15				

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Table 7

Pearson Product-Moment Correlations, Means, and Standard Deviations for the Between Year Variables (n= 52)

Yr 1 variables	Yr 2 variables				
	(1)	(2)	(3)	(4)	(5)
(1) PPVT-R	.67***	.15	.18	-.21	-.13
(2) Positive Affect freq.	.08	.23**	--	.23*	--
(3) Positive Affect dur.	.00	--	.31**	--	.21
(4) Negative Affect freq.	-.21	.01	--	.15	--
(5) Negative Affect dur.	-.25*	--	.12	--	.23*
(6) Low Directive freq.	-.02	-.20	--	-.02	--
(7) Low Directive dur.	.09	--	-.29**	--	-.13
(8) Med. Directive freq.	.13	.29**	--	.09	--
(9) Med. Directive dur.	.09	--	.30**	--	.13
(10) High Directive freq.	-.13	-.13	--	.11	--
(11) High Directive dur.	-.18	--	-.10	--	.22
(12) Off-task Behavior freq.	.03	.00	--	-.21	--
(13) Off-task Behavior dur.	.01	--	.05	--	-.11
(14) Social Status	.33**	.38***	.38***	.08	.08

Note 1. Social Status is available for Yr 1 only.

Note 2. Frequencies are based on proportions transformed by arc sine transformation. Durations are based on log transformations. \*p< .05. \*\*p< .025. \*\*\*p< .005. (one-tail)

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(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
-.02	-.07	.08	.01	-.18	-.19	.16	.10	.20
.06	--	.05	--	-.22	--	.01	--	.09
--	-.01	--	.02	--	-.27**	--	-.01	.19
-.17	--	-.32**	--	.17	--	.19	--	-.27**
--	-.04	--	-.27**	--	.05	--	.11	-.20
.31**	--	-.03	--	-.06	--	-.18	--	-.13
--	.24*	--	-.03	--	-.07	--	-.08	-.19
-.22	--	.53***	--	-.19	--	-.17	--	.30**
--	-.29**	--	.36***	--	.01	--	-.03	.33**
-.11	--	-.14	--	.37***	--	-.17	--	-.02
--	-.13	--	.08	--	.21	--	-.20	-.01
.03	--	.00	--	-.13	--	.24*	--	.02
--	-.03	--	.04	--	-.07	--	.18	.05
-.19	-.22	.33**	.30**	-.07	-.01	-.22	-.18	--

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Table 8

Pearson Product-Moment Correlations of Social Status (Yr 1) with Maternal Behavior (Yr 1 and Yr 2) and Child Competence (Yr 1 and Yr 2) (n=52)

	Yr 1 scores		Yr 2 scores	
	Frequency	Duration	Frequency	Duration
<b>Maternal behavior:</b>				
Positive Affect	.09	.19	.38***	.38***
Negative Affect	-.27**	-.21	.08	.08
Low Directiveness	-.13	-.19	-.19	-.22
Medium Directiveness	.30**	.33**	.33**	.30**
High Directiveness	-.02	-.01	-.08	-.01
Off-task Behavior	.02	.05	-.22	-.18
<b>Child competence:</b>				
PPVT-R score	.20	--	.33**	--

Note. For Yr 1 social status, X = 46.13, SD = 10.22, Minimum = 17, Maximum = 66.

\*p < .05, one tail. \*\*p < .025, one-tail. \*\*\*p < .005, one-tail.

**Section II. Multi-method Assessment of Maternal Behavior  
and Child Competence Over Time**

**Multi-method Assessment of Maternal Behavior  
and Child Competence Over Time**

**Janet N. Melby**

**Child Development Department**

**Iowa State University**

**Rand D. Conger**

**College of Family and Consumer Sciences**

**Iowa State University**

**Damaris Pease**

**Child Development Department**

**Iowa State University**

## Abstract

The relationship between subjective and objective assessments of maternal behavior and child cognitive (verbal) competence, both at particular points in time and across time, was the focus of the research. The subjects were 48 Iowa mothers and their 3-year-old first-born children who participated in the NC-158 regional longitudinal project (A Study of Parenting Beliefs in Rural and Urban Populations) for three consecutive years. The Peabody Picture Vocabulary Test-Revised (PPVT-R) assessed the child's cognitive (receptive verbal) ability. Maternal assessment of the child's competence was determined from the mentally alert factor of the Iowa Inventory for Parental Assessment of Children's Competencies. Maternal perceptions of her own parenting behaviors (Expressive, Instrumental) were obtained from selected item responses on the Q-Sort Inventory of Parenting Behaviors. Observations of maternal behavior occurring in a video-recorded mother-child problem-solving situation were coded using the Parent-Child Interaction Code for six behavioral categories (Positive Affect, Negative Affect, Low Directiveness, Medium Directiveness, High Directiveness, and Off-task Behavior). Hollingshead's Four Factor Index of Social was the indicator of social status. Maternal assessment of the child's competence was associated with objective measures of the child's competence. Maternal Q-Sort perception of Expressive behavior tended to negatively correlate with observed Negative Affect and High Directiveness. Perceived Expressive and Instrumental behaviors were

associated with measures of the child's competence. Observed Negative Affect at Yr 1 and observed Medium Directiveness at Yr 2 were associated with the child's PPVT-R score. Social status tended to be positively associated with observed Positive Affect and Medium Directiveness and negatively associated with observed Negative Affect. Social status was related to the child's PPVT-R score only at Yr 2. The need for multi-method and longitudinal assessments of the relationship between parent-child interaction and child competence is underscored by the lack of clear trends across-measures and across-years in the data.

## Introduction

Parent-child interaction studies have utilized a variety of techniques to assess the quality of the parent-child relationship, as well as developmental outcomes associated with variations in relationship characteristics. It has been suggested, however, that researchers need to focus more attention on observations of interaction processes rather than relying solely on either parental reports (e.g., interviews, questionnaires) or children's outcome measures as indicators of the parent-child relationship (Sigel, 1982; Maccoby & Martin, 1983).

Observational studies of parent-child interaction have been employed as a means to avoid the problems associated with a singular reliance on self-report measures and ability tests, as well as a means to focus greater attention on the contributions of both the parent and the child to the interaction situation (Cairns & Green, 1979; Maccoby & Martin, 1983). For example, Block (1957) reported that ipsative measures such as the q-sort correlated with observer ratings, however the research was based on observations of adults. A multi-method approach utilizing observational, self-report, and ability test measures provides greater confidence in the validity of the measures (Lytton, 1971).

Longitudinal studies of parent-child interaction are particularly needed to investigate associations between the parent-child relationship and developmental outcomes over time (Belsky, 1981; Maccoby, 1984). Additionally, observational measures are needed in longitudinal studies

of parent-child interaction (Cairns & Green, 1979; Felring & Lewis, 1978; Pellegrini, McGillicuddy-DeLisi, Sigel, & Brody, 1986).

The findings of research involving various measures of parent-child interaction have been somewhat inconsistent. While some researchers have found a relationship between parental self-report measures and observed parenting behaviors (McGowan & Johnson, 1984), conclusive evidence regarding the predictability of children's performance from parental behaviors is lacking. For example, although investigators have found a relationship between maternal behavior and child performance (Ramey, Farran & Campbell, 1979; Bee et al., 1982; Estrada, Arsenio, Hess, & Holloway, 1987), other researchers have concluded that the effects were minimal (McGowan & Johnson, 1984) or lacked consistency (Madden, O'Hara, & Levenstein, 1984).

The possible differential influence of instrumental (e.g., facilitating action by providing information, giving directions) versus affective (e.g., expressions of liking vs. disliking, displays of emotions) parental behaviors on the child's cognitive development also remains to be tested (Zajonc, 1980; Maccoby & Martin, 1983). Estrada et al., (1987) found that the affective quality of maternal behavior predicted the child's school-relevant performance, but was not associated with maternal intelligence, social status, or the child's gender. A clearer understanding of the parent-child relationship may require more detailed research regarding the manner in which maternal instrumental and affective behaviors differ in this process.

Furthermore, Skinner (1985) found maternal sensitive childrearing beliefs were related to observations of maternal behaviors (i.e., low directiveness of the child in the task; high directiveness in explaining the general task; medium level of responsiveness). However, Skinner did not test the association between maternal beliefs or behaviors and objective assessments of the child's competence. More work is needed to define the conditions under which specified maternal beliefs affect certain maternal behaviors and, in turn, the relationships of maternal beliefs and maternal behaviors to the child's competence.

Thus, conflicting results have been obtained in studies of the relationships among indicators of maternal behavior (self-report and observational measures) and child competence, as well as between the various measures themselves. A need exists for a multi-method approach to assessing the relationship between parental behavior (instrumental and affective) and the child's competence, particularly using longitudinal data (Maccoby, 1984; Rogosa, 1979).



### Purpose

The purpose of the present study was to examine the relationship between subjective and objective assessments of maternal behavior and child competence both at particular points in time and across time. The aspects of the mother's behavior specifically investigated were affective and directive behaviors. For purposes of the present investigation, affective behaviors were defined as expressions of liking vs. disliking and displays of emotions, while directive behaviors were defined as those providing information, giving directions, and/or facilitating action. The aspects of the child's competence specifically examined were cognitive (verbal) ability. The subjective measures were the mother's perception of her own parenting behaviors and her assessment of the child's mental ability. The objective measures were observations of maternal behavior during parent-child interaction sessions and standardized test results of the child's cognitive (verbal) competence.

It was hypothesized that, within and across time, positive relationships would exist between: (1) maternal assessment of the child's competence and objective assessment of the child's competence, (2) maternal perception of parenting behavior and objective observation of maternal parenting behavior, and (3) maternal parenting behavior and the child's competence.

## Method

### Subjects

The subjects were 48 Iowa mothers and their first-born 3-year-old children who participated each of three consecutive years in a regional longitudinal study (Lawton, Colman, Boger, Pease, Galejs, Looney, & Poresky, 1983).

Half of the mother-child pairs were from an urban environment, while the other half lived either on farms or small towns with a population less than 2,500 located outside a 50-mile radius of a standard statistical metropolitan area (SMSA). At data collection Yr 1, median age of the mothers was 27 years (range 21-35 years); median age of the fathers was 29 years (range 24-38 years). Median number of years of education completed was 14 years for both parents (range 12-18 years for mothers, 12-22 years for fathers). All of the fathers were employed outside the home; 31 (64.6%) of the mothers were employed outside the home.

the Four Factor Index of Social Status (Hollingshead, 1975) was used to code occupation. The occupational status for fathers ranged from 1 (menial service worker) to 9 (higher executives, major professionals), with a median of 6 (technicians, semiprofessionals). For the employed mothers, occupational status ranged from 3 (machine operators, semiskilled workers) to 8 (administrators, lesser professionals), with a median of 6.

### Measures

The measures used in the study were selected from a battery of instruments administered as part of the regional longitudinal study.

Peabody Picture Vocabulary Test-Revised. The Peabody Picture Vocabulary Test-Revised (PPVT-R) measures the child's cognitive (receptive verbal) ability and has demonstrated reliability and validity (Dunn, 1981).

Parent-Child Interaction Code. The Parent-Child Interaction Code (Melby, 1988) assesses verbal behavioral changes and, in the absence of verbal behaviors, nonverbal behavioral changes occurring in an interaction context. Frequencies and durations may be obtained for six behavioral categories: Positive Affect, Negative Affect, Low Directiveness, Medium Directiveness, High Directiveness, and Off-task Behavior.

Interobserver agreement was established on the basis of a larger number of subjects of which the present 48 subjects constituted a subsample (Melby, 1988). The intercorrelation of observer scores of the video-recorded interaction for the six behavioral categories ranged from .89 to .98 with a mean of .94. The mean kappa coefficient for all mothers and all six behavioral categories was .86. These reliability estimates were well within the range of acceptable values (Bakeman & Adamson, 1984; Hartmann, 1977).

Q-Sort Inventory of Parenting Behaviors. The Q-Sort Inventory of Parenting Behaviors (Q-Sort) (Lawton et al., 1983) contains 72

statements regarding parenting behaviors. Parents use a forced-choice procedure to sort statements into nine categories according to one's own perception of interaction with the child (1 = most like them, 9 = least like them). In a prior study, the test-retest reliability of the Q-Sort was  $r = .72$ , with .35 of the variance due to unique differences among respondents and .37 of the variance shared in common (Pease, Boger, Melby, Pfaff, & Wolins, in press).

#### Iowa Inventory of Parent Assessment of Children's Competencies

The Iowa Inventory of Parent Assessment of Children's Competencies (IIPACC) (Clark, Crase, and Pease, 1985) asks parents to rate their child from 1 (very poor) to 5 (very good) on 40 descriptions of child behaviors. Six factor scores are obtained: mentally alert, motorically skilled, pleasant, responsible, artistic, and musical. Discriminant validity of the six factor scores has been demonstrated (Clark et al., 1985).

Four Factor Index of Social Position. The Four Factor Index of Social Position (Hollingshead, 1975) incorporates parents education, occupation, gender, and marital status into a single measure of family social status. This single indicator has proven useful as a summary indicator of demographic characteristics that may influence maternal behavior and child competence (Gottfried, 1985).

#### Procedures

Data collection. Data were collected at yearly intervals over a three-year period (1982-1985). Local county extension facilities served

as data collection sites. Each family participated individually in a scheduled session which lasted for approximately one hour. During the first part of the session, parents independently completed the Q-Sort while assessments of the child (including the PPVT-R) were obtained. Subsequent to the completion of these measures, the mother-child dyad participated in a problem-solving task which was video recorded. The IIPACC, which had been mailed to the parents approximately one week prior to the scheduled session, was returned when the family arrived for the Yr 3 appointment.

Problem-solving task. Observation of maternal behavior was based on the interaction of mothers with their children during participation in a problem-solving puzzle task at Yr 1 and Yr 2 (Kontos, 1980; Melby, Pease, & Conger, 1988). The session was terminated when the puzzle was completed or at the end of 15 minutes, whichever occurred first.

Observational coding. Maternal behavior occurring in the first four minutes of all video-recorded sessions were independently coded by two observers using the Parent-Child Interaction Code (Melby, 1988). Observers coded verbal behavioral changes and, in the absence of verbal behaviors, nonverbal behavioral changes using 18 behavioral descriptors that, for purposes of statistical analysis, were later collapsed into six categories. Positive Affect included behaviors that indicated acceptance, approval, support, affirmation and favorable acknowledgment. Negative Affect included behaviors that indicated disapproval, rejection, disagreement, criticism, unfavorable acknowledgment, and

emotional appeals. Low Directiveness included watching the child manipulate puzzle pieces, pausing, and providing information but not actively intervening in the child's activities. Medium Directiveness included mutual involvement in manipulating puzzle pieces and asking questions to suggest a course of action. High Directiveness included pointing toward a particular puzzle piece, actually moving the child's hand, manipulating puzzle pieces while the child watched, and telling the child what to do. Off-task Behavior included verbal and nonverbal behaviors that did not contribute to the solution of the puzzle (Melby, 1988).

Consistent with suggestions regarding the need to examine both frequencies and durations of observed maternal behaviors occurring in an interaction context (Melby, Pease, & Conger, 1988), both frequency and duration measures were employed in the present investigation.

Observed frequencies and durations of Positive Affect and Negative Affect were considered indicators of maternal affective behaviors. Observations of Low Directiveness, Medium Directiveness, and High Directiveness were included as indicators of maternal instrumental behaviors. Off-task Behaviors were included as indicators of maternal behaviors that were neither primarily affective nor instrumental in nature, but occurred in the interaction session and contributed to the relative proportions of behaviors used in statistical analyses of the observational data.

Q-Sort statement subset. For the present investigation, selected statement responses from the Q-Sort Inventory of Parenting Behaviors (Lawton et al., 1983) were used as indicators of maternal perception of parenting behaviors (Expressive and Instrumental) at Yr 1, Yr 2, and Yr 3.

The statements included in the Expressive subset were: (1) I encourage my child to express his/her feelings openly, and (2) I encourage my child to be creative. The statements in the Instrumental subset were: (1) I show my child how to solve a problem step by step, and (2) I encourage my child to ask questions. Face validity suggested the items within each of the two subsets described behaviors in common and came closest to tapping the expressive and instrumental dimensions of interest for the present investigation.

Each of the statements was assigned the numerical value of the category into which it was placed (1-9). For purposes of the present investigation, scores below the median were then recoded as 1 (high emphasis), while scores above the median were recoded as 0 (low emphasis). For each subset, items were summed within each of the data collection years. Across the three data collection years, the ranges for all subsets were from 0 to 2, with means ranging from .81 to 1.16 and standard deviations from .67 to .84. Although the use of parental responses in this manner differed from the usual procedure for q-sort instruments, Michigan State University researchers B. Haas and R. Boger asked parents to respond to the statements on a Likert-type scale and

obtained comparable results as when using the q-sort procedure (personal communication, May, 1986).

Because the forced-choice q-sort procedure was followed in obtaining the statement responses used in the present investigation (i.e., the placement of one statement restricted the placement of other items) (Block, 1957; 1978), correlations between measures within a given year are not amenable for significance testing. The ipsativity of the measure contributes to the occurrence of negative correlations between variables within a set. Conversely, the presence of positive correlations between variables indicates a probable true association.

IIPACC factors. Maternal responses to the Iowa Inventory of Parent Assessment of Children's Competencies were obtained at Yr 3. One of the six IIPACC factors, mentally alert, was selected for inclusion in the present investigation as the maternal assessment of the child's cognitive competence. In the development of the IIPACC, the mean factor loading for the mentally alert factor was .64 (Clark et al., 1985). An example of one of the eight items contained in this factor is: shows intellectual sharpness.

#### Statistical Treatment

Transformations of behavioral data. The average of the two observer's scores for each of the 6 behavioral categories were used in data analysis in order to increase the true variance of the observational measures (Hartmann, 1977). In order to adjust for varying rates of observed maternal behavioral frequencies across sessions,



proportions of behavioral frequencies were obtained by dividing a given behavioral category by the total of all behaviors. The proportions were then transformed using the formula:  $X' = 2 \text{ arc sine } * \text{ square root of } X$ , where  $X$  is a proportion of the behavior (Winer, 1971). For the duration measures, the use of a standard 4-minute (240-second) interval essentially yielded duration proportions, however, because the variance of the behavioral categories varied in relation to the means, durations were transformed using the formula:  $X' = \text{Log } (X + 1)$ , where  $X$  is a duration of behavior (Snedecor & Cochran, 1981). To adjust for instances of nonoccurrence of behaviors, 1 was added across all behavioral categories.

Statistical tests. Pearson Product-Moment correlations were used to investigate the relationship between variables within and across data collection years (Nunnally, 1982). Despite the small sample size, the relationships among variables also were assessed using regression procedures. Stepwise multiple regression procedures were employed to determine the best predictor(s) of the child's competence (actual and perceived) at Yr 3.

In order to conserve space, two-tail tests of statistical significance are reported, although in some cases a one-tail test is appropriate. On this basis, significance is reported at  $p < .10$ , two-tailed.

## Results

Consistent with the hypotheses stated previously, results are first presented regarding maternal assessment of the child's competence and objective assessment of the child's competence. Secondly, the findings regarding maternal perception of parenting behavior and objective observation of maternal parenting behavior are presented. Finally, the associations between maternal parenting behavior and the child's competence are examined.

### Maternal Assessment and Objective Assessment of the Child's Competence

Within- and across-year correlations. Across the three data collection years, statistically significant Pearson Product-Moment correlations were obtained for the PPVT-R scores, the objective measure of the child's competence, as shown in Table 1. Even the lowest correlation of .50 between Yrs 1 and 3 was statistically and substantively significant ( $p < .001$ ). The correlation of the PPVT-R scores between Yrs 1 and 2 was  $r = .67$ ,  $p < .001$ , while the correlation for Yrs 2 and 3 was  $r = .59$ ,  $p < .001$ .

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Insert Table 1 about here

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Furthermore, the maternal assessment of the child as mentally alert at Yr 3, as measured by the IIPACC factor, was positively correlated with the child's PPVT-R score at each data collection year (Yr 1,  $r = .36$ ,  $p < .05$ ; Yr 2  $r = .46$ ,  $p < .01$ ; Yr 3,  $r = .37$ ,  $p < .01$ ).

Thus the data support the existence of a positive relationship between maternal assessment of the child's mental abilities and standardized assessments of the child's cognitive (verbal) competence. The fact that the IIPACC mentally alert factor was significantly correlated with the child's standardized assessment attests to the validity of the IIPACC mentally alert measure.

Maternal Perception and Objective Observation of Maternal Parenting Behavior

Within-measure correlations using maternal Q-Sort parenting perceptions. Maternal perceptions of one's own parenting behavior (expressive and instrumental), as measured by responses to subsets of Q-Sort statements, were relatively stable (see Table 2). There was a greater number of statistically significant correlations for Expressive perception ( $r = .27, p < .10$ ;  $r = .44, p < .001$ ; and  $r = .31, p < .05$ ) for Yr 1 with Yr 2, Yr 1 with Yr 3, and Yr 2 with Yr 3, respectively), than for Instrumental perception ( $r = .29, p < .05$ , for Yr 1 with Yr 2;  $r = .41, p < .001$ , for Yr 2 with Yr 3).

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Insert Table 2 about here

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In general, there was evidence to suggest that the mother's perceptions of her own parenting behaviors (expressive and instrumental) were relatively stable across time. Moreover, the trend was for the two measures to correlate more strongly within than between measures,

providing evidence for their discriminant validity. However, despite the ipsitivity of the measures, the presence of positive correlations between measures within each year suggests the presence of a general factor.

Within-measure correlations using observations of maternal parenting behaviors (frequencies and durations). Correlational analysis of observational assessments of maternal behavior for Yr 1 and Yr 2 indicated frequencies of maternal directive behavior, but not maternal affective behavior, were relatively stable. The intercorrelations for directive behaviors were: Low Directiveness,  $r = .30$ ,  $p < .05$ ; Medium Directiveness,  $r = .62$ ,  $p < .001$ ; High Directiveness,  $r = .50$ ,  $p < .001$ ; Off-task Behavior,  $r = .26$ ,  $p < .10$ .

The evidence regarding the stability of the duration measures of maternal parenting behavior is mixed. For Yr 1 and Yr 2, the intercorrelation for Positive Affect, but not Negative Affect, was statistically significant ( $r = .30$ ,  $p < .05$ ). Inter-correlations for Medium Directiveness and for High Directiveness were statistically significant ( $r = .49$ ,  $p < .001$ , and  $r = .35$ ,  $p < .01$ , respectively).

Across-measure correlations comparing observed maternal parenting behaviors (frequencies and durations) with maternal Q-Sort perceptions of parenting behaviors. Of the possible 76 correlations between observed frequencies of maternal behaviors and maternal perceptions of parenting behaviors, nine were statistically significant, as shown in Table 3.

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 Insert Table 3 about here  
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Observed frequencies of Positive Affect at Yr 1 positively correlated with perceived Instrumental behavior at Yr 1 and at Yr 2 ( $r = .29, p < .05$ , and  $r = .24, p < .10$ , respectively). Observed frequencies of Negative Affect at Yr 1 negatively correlated with perceived Expressive behavior at Yr 3 ( $r = -.26, p < .10$ ). At Yr 2 observed Negative Affect negatively correlated with perceived Expressive behavior ( $r = -.40, p < .001$ ). Observed Medium Directiveness was negatively correlated with perceived Instrumental behavior at Yr 3 ( $r = -.26, p < .10$ ). Observed High Directiveness at Yr 1 was negatively correlated with perceived Expressive behavior Yr 3 ( $r = -.33, p < .05$ ). At Yr 2, observed High Directiveness was negatively correlated with perceived Expressive behavior ( $r = -.25, p < .10$ ). Observed Off-task Behavior at Yr 1 correlated with perceived Instrumental behavior at Yr 3 ( $r = .26, p < .10$ ). At Yr 2, observed Off-task Behavior correlated with perceived Expressive behavior ( $r = .25, p < .10$ ).

For observed durations of maternal parenting behaviors, eleven of the 76 correlations with maternal Q-Sort perceptions of parenting behaviors were statistically significant, as shown in Table 4. The eleven statistically significant correlations included six relationships that were statistically significant using observed frequencies, plus four additional relationships.

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Insert Table 4 about here  
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Observed Positive Affect at Yr 1 correlated with perceived Instrumental behavior at Yr 2 ( $r = -.24, p < .10$ ), and observed Positive Affect as Yr 2 correlated with perceived Instrumental behavior at Yr 1 ( $r = .25, p < .10$ , respectively). Observed Negative Affect at Yr 1 negatively correlated with perceived Expressive behavior at Yr 3 ( $r = -.26, p < .10$ ). At Yr 2 observed Negative Affect negatively correlated with Yr 1 and Yr 2 perceived Expressive behavior ( $r = -.24, p < .10$ , and  $r = -.40, p < .001$ , respectively). Observed Low Directiveness at Yr 1 was significantly correlated only with perceived Expressive behavior at Yr 2 ( $r = .27, p < .10$ ). Observed Medium Directiveness at Yr 1 was negatively associated with perceived Instrumental behavior at Yr 3 ( $r = -.27, p < .10$ ). Observed Medium Directiveness was negatively correlated with perceived Expressive behavior at Yr 2 ( $r = -.30, p < .05$ ), but not with any other perceived maternal behaviors. Observed High Directiveness at Yr 1 was negatively correlated with perceived Expressive behavior at Yr 1 and Yr 3 ( $r = .35, p < .05$ , and  $r = -.38, p < .01$ ). At Yr 2, observed High Directiveness was negatively correlated with perceived Expressive behavior ( $r = -.29, p < .05$ ). Observed Off-task Behavior at Yr 2 correlated with perceived Expressive behavior ( $r = .25, p < .10$ ).

Thus, the findings regarding the relationship between observed maternal parenting behaviors and maternal Q-Sort perceptions of

parenting behaviors are mixed. Although all statistically significant within-year relationships are in the expected direction, the relationships do not exist for all within-year comparisons and differ somewhat depending upon whether frequencies or durations are used to assess observed behaviors. In general, mothers who were observed to interact with their children in a more positive manner, were more likely to perceive themselves to exhibit instrumental behaviors, whereas mothers who were observed to interact in a more negative manner, perceived themselves to facilitate less expressive behavior in their children. Mothers who were observed as highly directive tended to view themselves lower in promoting expressive behaviors, whereas mothers who engaged in more off-task behaviors perceived themselves to be higher in promoting expressive behaviors in their children.

#### Maternal Behavior and the Child's Competence

##### Within- and across-year correlations of maternal Q-Sort perceptions of parenting behaviors with objective and subjective child measures.

Within Yrs 1 and 2, but not 3, perceived Expressive behaviors correlated with the child's PPVT-R scores ( $r = .31$ ,  $p < .05$ , and  $r = .28$ ,  $p < .05$ , respectively) (see Table 5). Perceived Instrumental behaviors correlated with the child's PPVT-R scores at Yrs 1 and 3, but not 2 ( $r = .31$ ,  $p < .05$ , and  $r = .30$ ,  $p < .05$ , respectively). At Yr 3, the only year maternal assessment of the the child was available, perceived Expressive and Instrumental behaviors correlated significantly with maternal

assessment of the child as mentally alert ( $r = .46$ ,  $p < .01$ , and  $r = .63$ ,  $p < .01$ , respectively).

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 Insert Table 5 about here  
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Furthermore, at Yr 2, the child's PPVT-R score was positively predicted by perceived Expressive behavior ( $r = .28$ ,  $p < .05$ ) and perceived Instrumental behavior at Yr 1 ( $r = .25$ ,  $p < .10$ ) (see Table 3). At Yr 3, the child's PPVT-R score was positively predicted by perceived Instrumental behavior at Yr 2 ( $r = .37$ ,  $p < .05$ ) but not by perceived Expressive behavior. At Yr 3 the subjective child measure (maternal assessment of the child as mentally alert), was positively predicted by perceived Expressive behavior at Yr 1 and Yr 2 ( $r = .53$ ,  $p < .01$ , and  $r = .35$ ,  $p < .05$ , respectively) and by perceived Instrumental behavior at Yr 2 ( $r = .40$ ,  $p < .01$ ), but not Yr 1.

Viewed from the perspective of the child's competence predicting maternal behaviors, the child's Yr 1 PPVT-R scores positively predicted perceived Expressive behavior at Yr 2 and at Yr 3 ( $r = .25$ ,  $p < .10$ ;  $r = .27$ ,  $p < .10$ , respectively) and perceived Instrumental behavior at Yr 2 and Yr 3 ( $r = .25$ ,  $p < .10$ ;  $r = .51$ ,  $p < .01$ , respectively). The child's Yr 2 PPVT-R score was positively associated with perceived Instrumental behavior at Yr 3 ( $r = .44$ ,  $p < .01$ ).

Correlations of the child's competence with the family's Yr 1 social status were positive but low. Only the correlation with the



child's PPVT-R score at Yr 2 was statistically significant ( $r = .34$ ,  $p < .05$ ). The only statistically significant relationship with maternal perceptions of parenting behaviors was with Instrumental behavior at Yr 1 ( $r = .44$ ,  $p < .01$ ) (see Table 5).

The findings support the existence of a relationship between maternal perceptions of parenting behaviors and children's competence as assessed by both objective (standardized test) and subjective (maternal assessments of the child) measures. This relationship appears to be evident both within and across time. In general, mothers who perceived themselves to promote expressive and instrumental behavior in their children had children who scored higher on the standardized assessment of cognitive (verbal) competence and who were judged by their mothers to be more mentally alert. Except for the child's PPVT-R score at Yr 2, social status does not appear to be significantly related to the child's competence.

Within- and across-year correlations of observed maternal parenting behaviors (frequencies and durations) with objective and subjective child measures. For frequencies of observed maternal behavior, Pearson Product-Moment correlations yielded a statistically significant within-year correlation at Yr 2 between observed Medium Directiveness and the child's PPVT-R scores ( $r = .31$ ,  $p < .05$ ). However, no other within-year correlations involving frequencies of observed maternal parenting behaviors were statistically significant.

For durations of observed maternal parenting behaviors, the only statistically significant within-year correlation was at Yr 1 between Negative Affect and the child's PPVT-R score.

The child's PPVT-R score at Yr 2 was negatively predicted by duration of observed Negative Affect at Yr 1. However, no other frequency or duration measures of observed maternal behavior at Yr 1 were significantly correlated with the child's Yr 2 PPVT-R score. The child's PPVT-R score at Yr 3 was negatively predicted by frequency and duration of observed Negative Affect at Yr 2 ( $r = -.27$ ,  $p < .10$ , and  $r = -.25$ ,  $p < .10$ , respectively). No other maternal behaviors observed at Yr 1 or Yr 2 were significantly correlated with the child's Yr 3 PPVT-R score.

Furthermore, maternal assessment of the child as mentally alert at Yr 3, the only year for which this measure was available, was negatively predicted by frequency and duration of observed Positive Affect at Yr 1 ( $r = -.27$ ,  $p < .10$ , and  $r = -.26$ ,  $p < .10$ , respectively) and by frequency and duration of observed Negative Affect at Yr 2 ( $r = -.30$ ,  $p < .05$ , and  $r = -.38$ ,  $p = .05$ , respectively). No other across-year correlations involving maternal assessment of the child as mentally alert were statistically significant.

Family social status was positively correlated with observed frequencies of Positive Affect at Yr 1 and with Medium Directiveness at Yrs 1 and 2 ( $r = .41$ ,  $p < .01$ ;  $r = .30$ ,  $p < .05$ ;  $r = .35$ ,  $p < .01$ , respectively) and negatively correlated with Negative Affect at Yr 1 and

Off-task Behavior at Yr 2 ( $r = .24, p < .05$ ). Family social status positively correlated with observed durations of Positive Affect at Yrs 1 and 2 ( $r = .24, p < .10$ ;  $r = .41, p < .01$ ), as well as with Medium Directiveness at Yrs 1 and 2 (both  $r = .33, p < .05$ ).

In general, with the exception of observed maternal negative behaviors, observations of maternal parenting behaviors did not appear to be related to the child's competence as assessed by either objective or subjective means. Mothers who were observed to be more negative in interaction with their children, particularly at Yr 2, tended to have children who at Yr 3 performed lower on the PPVT-R and who were judged to be less mentally alert by their mothers. At Yrs 1 and 2, mothers in families with a higher social status tended to exhibit more positive behaviors and to be more mutually involved in the task than mothers from lower social status families. In addition, at Yr 1, mothers from higher social status families were observed to be less negative in interaction with their children.

#### Prediction of the child's competence using regression procedures.

Despite the small sample size, stepwise regression procedures were employed as a data exploration device to determine the "best" predictor of the child's objectively and subjectively assessed competence at Yr 3. The variables included in the regression equations were the variables identified as statistically significant through correlational procedures. The Yr 2 variables included: the child's PPVT-R score, perceived Expressive behavior, perceived Instrumental behavior, and

observed frequency of Negative Affect. The model also included either the Yr 3 PPVT-R score or the Mentally Alert factor, as well as Yr 1 social status, as predictor variables.

As previously indicated, the "best" single predictor of both the child's PPVT-R score and maternal IIPACC assessment of the child as Mentally Alert at Yr 3 was the child's PPVT-R score at Yr 2. The addition of Yr 2 perceived Instrumental behavior and observed Negative Affect to the regression equations increased the significance of the models and reduced the contributions of the child's Yr 2 PPVT-R score. Perceived Expressive behavior at Yr 2 and social status at Yr 1 did not contribute significantly to the models predicting either the child's Yr 3 PPVT-R score or maternal assessment of the child as Mentally Alert at Yr 3.

The child's prior competence was the best indicator of the child's later competence, whether objectively measured or perceived by the mother. However, caution is required in interpretation of regression results due to the small sample size.

### Summary

Correlational findings suggest that mothers who rated themselves high on facilitation of expressive and instrumental behaviors also perceived their children to be mentally alert. Furthermore, the findings suggest that children who were rated as mentally alert by their mothers tended to have higher scores on the PPVT-R test at each of the data collection years. The correlations between objective assessment of the child's competence and maternal assessment of the child's competencies, and the correlations between perceived maternal parenting behaviors and maternal assessments of the child, were of a larger magnitude than correlations between maternal perceptions of parenting behaviors and the child's actual cognitive (verbal) performance. Mothers who perceived themselves as promoting expressive and instrumental behavior in their children also tended to view their children as more mentally alert.

The results of correlations using observed maternal parenting behavior with maternal perceptions of parenting behaviors and with the child's competence were less clear. In general, mothers who were observed to interact with their children in a more positive manner, were more likely to perceive themselves to exhibit instrumental behaviors, whereas mothers who were observed to interact in a more negative manner, perceived themselves to facilitate less expressive behavior in their children. Mothers who were observed as highly directive tended to view themselves lower in promoting expressive behaviors, whereas mothers who

engaged in more off-task behaviors perceived themselves to be higher in promoting expressive behaviors in their children. With the exception of observed maternal negative behaviors, observations of maternal parenting behaviors did not appear to be related to the child's competence as assessed by either objective or subjective means. Mothers who were observed to be more negative in interaction with their children, particularly at Yr 2, tended to have children who at Yr 3 performed lower on the PPVT-R and who were judged to be less mentally alert by their mothers. A positive association existed between the child's prior competence and the later maternal perception of expressive and instrumental behaviors.

The best single predictor of the child's competence at Yr 3 was identified as the child's Yr 2 PPVT-R score. In addition, maternal perception of instrumental behavior and the observed maternal negative interactions with the child at Yr 2 contributed significantly to the models predicting the child's competence at Yr 3. Social status and reported expressive behaviors did not contribute significantly to the models.

The relatively low correlation of social status with the child's competence and the lack of significance of social status in the regression models may be a function of the lack of urban poor, as found in other areas, in the present sample.

Although caution is required in interpretation of regression results due to the small sample size, the findings suggest that future

research should attend to maternal reports, as well as to objective measures of the child's competence, rather than relying primarily on limited observations of parental behaviors.

Although procedures used for obtaining observations of maternal parenting behaviors (Melby, 1988) were determined on the basis of prior research, it is possible that the length of time selected for observation of maternal behaviors, or the manner in which observation categories were defined, was not adequate for the identification of maternal behaviors that were significantly related to either the child's competence or to maternal perceptions of her own behavior. Furthermore, except for negative maternal behaviors and frequency of mutually involved behaviors (Medium Directiveness), it is possible that the types of maternal behaviors assessed in the present investigation were not significantly related, either within or across years, to competence in children. Using ratings of maternal behaviors occurring in a longer portion of the interaction session, rather than using micro-analysis of observations of maternal behaviors occurring in a shorter portion of the interaction session, may more adequately describe behaviors that are related to maternal perceptions and to the child's actual competence.

On the other hand, perhaps more attention needs to be focused on the sequence and patterning of the behaviors of mothers and their children. Including behaviors of children and examining the contingent responses of mothers and children may yield further clarity to the relationship between maternal behavior and children's competencies.

Regardless of these limitations, it remains clear that mothers have some concept of their children's competencies. Other than for observed negative behaviors and medium directiveness, observed maternal parenting behaviors, at least as judged in the present study, were not related to the child's competence. These findings support the need for the inclusion of parental report measures and standardized child assessments in observational studies of the relationship between parent-child interaction and the child's competence.

In summary, the results of these analyses suggest that maternal judgments of the child's mental ability corresponds relatively highly with the child's actual competence as assessed by objective means. However, a lack of clear trends was evident in the relationships between objectively observed and maternal perceptions of parenting behaviors. Mother's perceptions of her own behaviors correspond moderately with objective and subjective measures of the child's competence. With the exception of observed negative behaviors and medium directiveness, observed maternal behaviors were not strongly related to indicators of the child's competence. The best models for the prediction of the child's competence at Yr 3 were models which included, from Yr 2, the child's PPVT-R score, mother's perception of herself as promoting instrumental behavior, and observed maternal negative affect.



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Table 1

Pearson Product-Moment Correlation of Child's PPVT-R<sup>a</sup> Scores  
(Yrs 1, 2, and 3) and Mother's Assessment of the Child on the  
IIPACC<sup>b</sup> Mentally Alert Factor (Yr 3)<sup>c</sup>

Variables	(1)	(2)	(3)	(4)
(1) PPVT-R Yr 1	--	.67***	.50***	.36*
(2) PPVT-R Yr 2		--	.59***	.46**
(3) PPVT-R Yr 3			--	.37*
(4) IIPACC: Mentally Alert (Yr 3)				--
Mean	28.92	46.77	62.52	36.31
SD	13.49	12.31	10.80	3.95
Minimum	7.00	18.00	43.00	22.00
Maximum	58.00	71.00	85.00	40.00

<sup>a</sup>Peabody Picture Vocabulary Test-Revised.

<sup>b</sup>Iowa Inventory for Parental Assessment of Children's Competencies.

<sup>c</sup> $n = 48$  for all correlations, except correlations involving the Mentally Alert factor  $n = 42$ .

\* $p < .05$ , two-tailed. \*\* $p < .01$ , two-tailed. \*\*\* $p < .001$ , two-tailed.

Table 2

Pearson Product-Moment Correlations of Maternal Perception  
(Q-Sort) of Parenting Behaviors (Yrs 1, 2, and 3) (n = 48)

Maternal perception (Q-Sort)	(1)	(2)	(3)	(4)	(5)	(6)
(1) Expressive Yr 1	--	.27*	.44***	.17	.31**	.39***
(2) Expressive Yr 2		--	.31**	.10	.11	.20
(3) Expressive Yr 3			--	.14	.14	.37
(4) Instrumental Yr 1				--	.29**	.15
(5) Instrumental Yr 2					--	.41***
(6) Instrumental Yr 3						--
Mean	1.12	1.81	1.12	1.02	1.17	1.12
SD	.84	.67	.81	.70	.72	.79
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	2.00	2.00	2.00	2.00	2.00	2.00

\*p < .05, two-tailed. \*\*p < .01, two-tailed. \*\*\*p < .001, two-tailed.

Table 3

Correlation of Maternal Perception (Q-Sort) of Parenting Behaviors  
(Yrs 1, 2, and 3) with Observed Frequencies of Maternal Parenting  
Behaviors (n = 48)

Observed frequencies of maternal behavior	Maternal perception (Q-Sort)					
	Expressive			Instrumental		
	Yr 1	Yr 2	Yr 3	Yr 1	Yr 2	Yr 3
Positive Affect Yr 1	-.17	-.13	.02	.29**	-.22	-.17
Positive Affect Yr 2	.07	.09	.03	.24*	.07	.02
Negative Affect Yr 1	-.10	.03	-.26*	-.18	.09	.00
Negative Affect Yr 2	-.21	-.40***	-.20	.17	.08	-.15
Low Directiveness Yr 1	.14	.21	.07	.04	.01	.04
Low Directiveness Yr 2	-.17	.21	-.02	-.17	-.01	.07
Medium Directiveness Yr 1	-.07	-.18	.07	-.01	-.11	-.26*
Medium Directiveness Yr 2	.16	.00	.16	.15	-.06	.00
High Directiveness Yr 1	-.22	-.13	-.33**	-.23	-.02	-.16
High Directiveness Yr 2	-.04	-.25*	-.18	-.15	.01	-.04
Off-task Behavior Yr 1	.14	.00	.22	.09	.10	.26*
Off-task Behavior Yr 2	.21	.25*	.21	.02	-.02	.00

\*p < .10, two-tailed. \*\*p < .05, two-tailed.  
 \*\*\*p < .01, two-tailed.

Table 4

Correlation of Maternal Perception (Q-Sort) of Parenting Behaviors (Yrs 1, 2, and 3) with Observed Durations of Maternal Behaviors (Yrs 1 and 2) (n = 48)

Observed durations of maternal behavior	Maternal perception (Q-Sort)					
	Expressive			Instrumental		
	Yr 1	Yr 2	Yr 3	Yr 1	Yr 2	Yr 3
Positive Affect Yr 1	-.20	-.20	.00	.22	-.24*	-.18
Positive Affect Yr 2	.10	.01	.04	.25*	.04	-.03
Negative Affect Yr 1	-.23	-.08	-.24*	-.10	.14	.03
Negative Affect Yr 2	-.24*	-.43***	-.19	.19	.06	-.19
Low Directiveness Yr 1	.20	.27*	.20	-.02	.02	.06
Low Directiveness Yr 2	-.21	.22	-.02	-.12	.12	.07
Medium Directiveness Yr 1	-.11	-.30**	-.06	.01	-.06	-.27
Medium Directiveness Yr 2	.17	-.01	.14	.08	-.09	-.03
High Directiveness Yr 1	-.35**	-.21	-.38***	-.15	-.04	-.18
High Directiveness Yr 2	.05	-.29**	-.15	-.14	-.12	-.08
Off-task Behavior Yr 1	.11	-.07	.14	.03	.03	.22
Off-task Behavior Yr 2	.22	.25*	.19	.11	-.01	.01

\* $p < .10$ , two-tailed. \*\* $p < .05$ , two-tailed. \*\*\* $p < .01$ , two-tailed.

Table 5

Correlations of Maternal Perception (Q-Sort) of Parenting Behaviors  
(Yrs 1, 2, and 3), the Child's PPVT-R<sup>a</sup> Scores, Maternal IIPACC<sup>b</sup>  
Mentally Alert Factor (Yr 3), and Social Status (Yr 1)<sup>c</sup>

Variables	PPVT-R			IIPACC Mentally Alert	Social Status
	Yr 1	Yr 2	Yr 3	Yr 3	Yr 1
Maternal perception (Q-Sort):					
Expressive Yr 1	.31**	.28**	.18	.53***	.20
Expressive Yr 2	.25*	.28**	.22	.35**	-.11
Expressive Yr 3	.27*	.21	.19	.46***	-.05
Instrumental Yr 1	.31**	.25*	.07	.22	.44***
Instrumental Yr 2	.25*	.21	.37***	.40***	.02
Instrumental Yr 3	.51***	.44***	.30**	.63***	-.01
Social status Yr 1	.21	.34**	.17	.13	--
Mean	28.95	46.77	62.52	36.31	46.22
SD	13.49	12.31	10.80	3.95	10.40
Minimum	7.00	18.00	43.00	22.00	17.00
Maximum	58.00	71.00	85.00	40.00	66.00

<sup>a</sup>Peabody Picture Vocabulary Test-Revised.

<sup>b</sup>Iowa Inventory for Parental Assessment of Children's Competencies.

<sup>c</sup> $n = 48$  for all correlations, except correlations involving the Mentally Alert factor  $n = 42$ .

\* $p < .10$ , two-tailed. \*\* $p < .05$ , two-tailed. \*\*\* $p < .01$ , two-tailed.



## General Summary and Implications

### General Summary

The research under investigation examined relationships among maternal behavior, the child's competence, and family social status within and across time, using objective and subjective measures. Of specific interest were maternal affective and directive behaviors and the child's cognitive (verbal) competence. Data were from 52 Iowa families with a 3-year-old first-born child who participated in the NC-158 regional longitudinal project, "A Study of Parenting Beliefs in Rural and Urban Populations" (Lawton, Colman, Boger, Pease, Galejs, Looney, & Poresky, 1983) at consecutive yearly intervals over a three-year period.

Vygotsky's socially oriented view of cognitive development served as the theoretical framework for the investigation (Vygotsky, 1962, 1978). According to this view, cognitive growth in children results from their interaction in the social world. As children interact with their social environment they develop language skills to use in regulating their own actions. Parents and other adults serve as mediators in this process. In effective mediation, children and their mediators influence each other and make mutual adjustments. However, questions have arisen regarding the differential roles of affective and directive behaviors in the mediation process (Brown, Bransford, Ferrera, & Campione, 1983; Maccoby & Martin, 1983; Zajonc, 1980).

The present study focused on the affective and directive dimensions of maternal behaviors. Affective behaviors were defined as behaviors of an expressive nature which indicated likes vs. dislikes and/or displayed emotions. Directive behaviors were defined as behaviors of an instrumental nature which conveyed information and/or facilitated action.

In order to strengthen the validity of the findings, a variety of measurement techniques (see Table 1) was used to assess both the quality of the parent-child relationship, as well as developmental outcomes associated with variations in relationship characteristics (Lytton, 1971).

-----  
Insert Table 1 about here  
-----

Both objective and subjective measures of maternal behaviors were used in the investigation. The Parent-Child Intereaction Code (Melby, 1988) was used to obtain objective assessments of maternal affective and directive behaviors observed in time-dubbed video recordings of parent-child problem-solving interaction at Yr 1 and Yr 2. Behavioral frequencies and durations were obtained for six behavioral categories using a computer program developed by Conger and Sung (1988). The affective categories included: Positive Affect and Negative Affect. The directive categories included: Low Directiveness, Medium Directiveness, and High Directiveness. The category Off-task Behavior

was included to account for behaviors that did not contribute to solution of the problem or express emotion. The subjective measure of maternal behavior was the mother's perceptions of her own parenting behavior (Expressive and Instrumental) obtained from selected item responses on the Q-Sort Inventory of Parenting Behaviors (Lawton et al., 1983) at Yrs 1, 2, and 3. To differentiate between observations of maternal behaviors and maternal perceptions of parenting behaviors, the terms affective and directive were associated with observed behaviors, whereas the terms expressive and instrumental were associated the mother's perceptions of her own parenting behaviors.

The objective measure of the child's competence was the Peabody Picture Vocabulary Test-Revised (PPVT-R) scores at each of the three data collection years. The subjective measure of the child's competence was maternal assessment of the child's mental ability as measured by the Iowa Inventory for Parental Assessment of Children's Competencies (IIPACC) (Clark, Crase, & Pease, 1985) at Yr 3.

Social status has been shown to be related to both maternal behaviors and the child's competence (Bee, Van Egeren, Streissguth, Nyman, & Leckie, 1969; Brophy, 1970; Hess & Shipman, 1965; Sigel, 1982), however, conflicting findings are evident regarding the relative contributions of social status. Thus, family social status was included as a study variable. The Four Factor Index of Social Position (Hollingshead, 1975) was used to identify family social status at Yr 1.

The presence of high inter-observer agreement on the observations of maternal behavior suggested that observed maternal behaviors were reliably measured within each year. Inter-individual differences in observed maternal behaviors were relatively stable across time (Yr 1 to Yr 2). However, mean levels of observed maternal affective and directive behaviors changed across time and were associated with changes in the age of the child (from 3 to 4 years of age). Consistent with Vygotsky's theory (Vygotsky, 1962, 1978), evidence of maternal behavior changes suggested that as children increase in their ability to solve problems independently (associated here with an increase in age), the adult assumed a less directive role in the problem-solving situation.

The within-measure, across-year PPVT-R correlations were of a higher magnitude than for any other within-measure, across-year comparisons and suggested relative stability of this measure of the child's competence.

Five of the six within-measure, across-year comparisons of maternal perception (Q-Sort) of parenting behaviors (Expressive and Instrumental) were statistically significant, suggesting stability of these maternal perceptions. However, the across-measure, within-year correlations were positive, suggesting the presence of a general factor.

The correlations between maternal assessment of the child as mentally alert at Yr 3, the only year this measure was available, and objective measure of the child's competence at Yrs 1, 2, and 3, were all statistically significant. This finding suggested that mothers have

some concept of the child's competence and attested to the validity of the IIPACC mentally alert factor.

In general, the across-measure, within-year correlations for the observations and maternal perceptions of parenting behaviors at Yr 1 and Yr 2 indicated that observed Positive Affect was positively associated with maternal perception of Instrumental behavior. Mothers observed as higher in Negative Affect and in High Directiveness perceived themselves lower in facilitation of Expressive behavior in their children. Observed Off-task Behavior was positively associated with maternal perception of promoting Expressive behavior in their children. Mothers observed as exhibiting greater amounts of High Directiveness were significantly more likely to perceive themselves as lower in Expressive behavior.

With the exceptions of observed duration of Negative Affect at Yr 1 and observed frequency of Medium Directiveness at Yr 2, observed maternal parenting behaviors were not significantly associated with the child's PPVT-R scores at Yr 1 or Yr 2. Conversely, four of the six within-year correlation of maternal perception of own parenting behaviors with the child's PPVT-R score were statistically significant. Furthermore, maternal assessment of the child as mentally alert at Yr 3 was positively associated with the child's PPVT-R score at Yrs 1, 2, and 3.

At Yr 1, family social status was negatively associated with Negative Affect and positively associated with Medium Directiveness and

maternal perception of Instrumental behavior. At Yr 2, family social status was positively associated with the child's PPVT-R score, Positive Affect, and Medium Directiveness and negatively associated with Off-task Behavior. However, at Yr 2 maternal behavior did not function as a mediator in the relationship between social status and child competence. Family social status was not associated with the Yr 3 indicators of child competence or maternal perception (Q-Sort) of parenting behavior.

Family social status at Yr 1 was the most salient predictor of the the child's competence at Yr 2, as assessed by the PPVT-R score. Additionally, Yr 1 maternal behavior predictors of the child's PPVT-R score at Yr 2 included: perceived Expressive behavior, perceived Instrumental behavior, and observed duration of Negative Affect.

At Yr 3, the child's PPVT-R score was negatively predicted by Yr 2 Negative Affect, and positively predicted by perceived Yr 2 Instrumental behavior. The most salient predictors of the child's Yr 3 PPVT-R score were the child's PPVT-R scores at Yrs 1 and 2. Maternal assessment of the child as mentally alert at Yr 3 was positively predicted by perceived Expressive behavior at Yrs 1 and 2, by perceived Instrumental behavior at Yr 2, and by the child's Yr 1 and Yr 2 PPVT-R scores. Positive Affect at Yr 1 and Negative Affect at Yr 2 were negatively predicted maternal assessment of the child as mentally alert at Yr 3. Social status was not statistically significant in predicting the child's competence at Yr 3.

From the perspective of child competence predicting maternal behaviors, higher Yr 1 PPVT-R scores predicted higher maternal perceived Expressive behavior and Instrumental behavior at Yrs 2 and 3. Higher Yr 2 PPVT-R scores predicted maternal assessment of the child as mentally alert and higher maternal perceived Instrumental behavior at Yr 3. The child's competence at Yr 1 did not predict observed maternal behaviors at Yr 2; observed maternal behaviors were not available for Yr 3.

#### Implications

The results of the present investigation supports the need for a multi-method approach to the study of the relationship between parent-child interaction and the child's competence.

Maternal perceptions of parenting behavior tended to be positively correlated with objective assessments of the child's competence. However, only a small number of statistically significant correlations of observed maternal parenting behaviors were obtained. These findings suggest that observations of maternal behaviors in and of themselves may not be adequate in efforts to understand the relationship between the parent-child relationship and indicators of the child's competence. Future research should attend to maternal reports and objective measures rather than to limited observations of parental behavior.

Although some general trends were evident at each data collection year, for example the negative association between Negative Affect and the child's PPVT-R score, the use of longitudinal data indicated that relationships determined to be statistically significant at one point in

time were not necessarily significant at another point in time. This was particularly apparent in the findings regarding family social status and the child's PPVT-R score. At Yr 1, social status was related to aspects of observed maternal behaviors, but was not related to the child's PPVT-R score. However, the conclusion at Yr 2 was that social status was significantly related to the child's competence, as well as to certain aspects of observed maternal behavior. Furthermore, social status was not significantly related to the child's PPVT-R score at Yr 3 and was of limited statistical significance in relation to maternal perceptions of parenting behavior at Yr 1, 2, or 3.

It is possible that social status exerts a stronger influence upon relationships at particular points in time. On the other hand, rather than using social status as assessed at the beginning of the longitudinal study, it may be necessary to recalculate social status at each data collection point and account for changes in social status when investigating the relationship between parent-child interaction and child competence over time, particularly when dealing with young families whose occupational status may not be stabilized.

The findings obtained using frequency and duration measures of observed maternal behaviors were not consistent across all analyses, suggesting the lack of clear evidence regarding which is the more appropriate measure. Conclusions based on one measure may differ somewhat from conclusions based on the other measures. Researchers using observational assessments of interaction need to be sensitive to



the varying results that may be obtained with the two approaches to describing behaviors.

Despite the lack of clear and consistent associations between observed maternal behaviors and the child's competence, the evidence that changes in observed maternal behaviors were associated with changes in the age of the child is a significant finding of the present investigation. Furthermore, evidence that Negative Affect was negatively correlated with the child's PPVT-R score at Yr 1, whereas Medium Directiveness was positively correlated with the child's PPVT-R score at Yr 2 is important and illustrates the differential relationship between affective and instrumental behaviors at two points in time. The evidence regarding the association between maternal perceptions of Expressive and Instrumental behaviors in relation to the child's competence (measured by the PPVT-R and by the maternal assessment of the IIPACC mentally alert factor) suggests that both Expressive and Instrumental perceptions are positively associated with the child's competence. It is possible that, in contrast to observations of maternal behaviors, maternal reports capture a more general overview of maternal behavior and attitudes that are associated with child competence. In terms of maternal reports, both perceived expressive and perceived instrumental behaviors (with the exception of expressive behaviors and the PPVT-R at Yr 3) were related to the child's objectively and subjectively assessed competence across the three data collection years.

Although the present investigation utilized frequency and duration measures of observed maternal behaviors, it is possible that the timing and sequencing of behaviors may be of greater significance than the amount of behavior. For example, future research should address the contingent responses of parents. In light of the present investigation, a potential area for further study is the behavior that occurs following a negative maternal behavior.

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Table 1

Concepts and Instruments Used In the Study of Maternal  
Behavior and Child Competence Over Time

Concept	Variable	Measure
Maternal behavior	Affect 1. Positive 2. Negative	Parent-Child Interaction Code (affective behaviors)
	Directiveness 1. Low 2. Medium 3. High	Parent-Child Interaction Code (directive behaviors)
	Expressive	Q-Sort (expressive subset)
	Instrumental	Q-Sort (instrumental subset)
Child competence	Cognitive competence	PPVT-R
		IIPACCa (mentally alert factor)
Family social status	Social status	Four Factor Index of Social Position

<sup>a</sup>Iowa Inventory of Parental Assessment of Children's  
Competencies.

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Type	Year
Observation	1,2
Observation	1,2
Maternal self-report	1,2,3
Maternal self-report	1,2,3
Standartized test	1,2,3
Maternal assessment of child	3
Interview	1

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### Acknowledgments

I wish to express my sincere appreciation to Dr. Damaris Pease, my major professor, for her guidance throughout my graduate education. Gratitude is expressed to Dr. Pease and Dr. Rand Conger, my minor professor, for their time, support, assistance, and encouragement during the preparation and completion of this dissertation. Thanks also are expressed to members of my committee, Dr. Samuel Clark, Dr. Rosalie Norem, and Dr. Leroy Wolins, as well as to Dr. Dianne Draper, chair of the Child Development Department, for their guidance and support in this endeavor.

I would like to thank the numerous graduate students who assisted in the collection and organization of data for the NC-158 regional longitudinal project, "A Study of Parenting Beliefs in Rural and Urban Families", from which the data for this dissertation were obtained. Thanks are especially extended to Marian Bailey, Kimberly Kleckner, and Kathy Fraher.

Gratitude also is expressed to several people who provided constructive comments on various revisions of the Parent-Child Interaction Code: Debora Wells, Marian Bailey, and Delora Hade. Nae Kyung Sung is thanked for his work in the development of the computer program which made it feasible to examine observational data in the manner used in this study.

A special thank-you is extended to the Iowa parents and children who participated for the duration of the longitudinal project and

provided the data to use in examining parent-child relationships.

The financial support of the Child Development Department and the College of Family and Consumer Sciences Research Institute was fundamental to the execution of this project and is gratefully acknowledged.

Finally, to my spouse, Russell, and to my children, Kristin and David, as well as to members of my extended family, I give my appreciation and love for all that they have contributed to making this endeavor possible.

**Appendix**

Parent-Child Interaction Code  
Manual

Janet N. Melby  
Child Development Department  
Iowa State University

## Table of Contents

Introduction . . . . .	1
Rational . . . . .	1
Appropriate Use of the Code . . . . .	4
Description of the Code . . . . .	4
Parent-Child Interaction Code . . . . .	7
Directions . . . . .	7
Nonverbal behavior descriptors . . . . .	7
Verbal behavior descriptors . . . . .	8
Examples . . . . .	9
Decision rules . . . . .	12
Scoring . . . . .	14
Application of the Code . . . . .	15
Definition of Derived Behavior Categories . . . . .	15
Research Application of the Code: An Example . . . . .	16
Observer Agreement and Reliability . . . . .	17
Computation of observer agreement and reliability. . . . .	17
Observer agreement for 18 behavior descriptors . . . . .	18
Observer agreement for mothers . . . . .	18
Observer agreement for children . . . . .	18
Observer agreement for 6 derived categories . . . . .	19
Observer agreement for mothers . . . . .	19
Observer agreement for children . . . . .	19
Summary of Observer Agreement Results . . . . .	19

References . . . . .	20
Coding Sheet . . . . .	24

#### List of Tables

Table 1. Behavioral Categories and Associated Verbal and Nonverbal Behavioral Descriptors . . . . .	26
Table 2. Interobserver Agreement (Correlations and Effective Percent Agreement) for Maternal Behavioral Descriptors (Yr 1 and Yr 2) . . . . .	27
Table 3. Interobserver Agreement (Correlations and Effective Percent Agreement) for Children's Behavioral Descriptors (Yr 1 and Yr 2) . . . . .	29
Table 4. Interobserver Agreement (Correlations and Effective Percent Agreement) for Maternal Behavioral Categories (Yr 1 and Yr 2) . . . . .	31
Table 5. Interobserver Agreement (Correlations and Effective Percent Agreement) for Children's Behavioral Categories (Yr 1 and Yr 2) . . . . .	32

## Introduction

The Parent-Child Interaction Code was developed to yield information about affective and instrumental parent-child interaction behaviors. The code is based on several approaches to behavioral coding (Bee et al., 1982; Conger, Brainerd, Birch, Friedberg, & Navarro, 1986; Hess & Shipman, 1965, 1968; McGillicuddy-DeLisi, 1985; Skinner, 1985). However, somewhat unique features of the Parent-Child Interaction Code include the use of identical behavioral descriptors for coding parent and child behaviors, the definition of 18 behavioral descriptors and 6 derived categories, and the appropriateness of the code for obtaining behavioral frequencies, durations and contingencies using a computer program developed by Conger and Sung (1988).

### Rational

The intricate relationship between parents and their children has been explored by numerous researchers. These efforts have attempted to increase understanding of the relative contributions of the parent and child to the relationship, to increase awareness of the manner in which contextual factors are associated with the relationship, and to explore the implications of the relationship for development of the parent and the child.

Early studies of parent-child interaction tended to be unidirectional studies that explored the effects of the mother's actions upon the child (Ainsworth, 1969; Sears, 1951; Sears, Maccoby, & Levin, 1957). However, more recently, emphasis has been placed upon the

reciprocal nature of parent-child interaction (Brazelton, Koslowski, & Main, 1974; Martin, Maccoby, Baron, & Jacklin, 1981). Several researchers have noted that in order to understand child development, the child should be studied as a member of his/her social system (Bronfenbrenner, 1977; Belsky, 1981; Lamb, 1976; Maccoby, 1984; Maccoby & Martin, 1983).

Techniques employed in the study of parent-child interaction include experimental manipulations, naturalistic observations, and self-report data. However, questions have arisen about the validity of relying solely on parental reports (e.g., interviews, questionnaires) or child's outcome measures as assessments of parent-child relationships. For example, Sigel (1982) and Maccoby and Martin (1983) suggested that researchers need to focus more attention on interaction processes rather than merely relying on children's outcome measures as indicators of ineffectiveness.

Observational studies of parent-child interaction have been attempted as a means to avoid the problems associated with self-report and ability tests, as well as a means to focus greater attention on the contributions of both the parent and the child to the interaction (Maccoby & Martin, 1983).

Observational studies of the interaction of parents and their preschool-age children have often involved problem-solving situations (Bee, Van Egeren, Streissguth, Nyman, & Leckie, 1969; Osofsky & O'Connell, 1972; Pellegrini, McGillicuddy-DeLisi, Sigel, & Brody, 1986)



or teaching situations (Bergan, Newmann, & Karp, 1983; Petrie, Kratochwill, Bergan, & Nicholson, 1981; McGillicuddy-DeLisi, 1985). Anderson and Messick (1974) identified "problem-solving skills" as a facet of social competency in young children and suggested that the strategies children learn at an early age will generalize to future problem-solving situations. Wertsch, McNamee, McLane, and Budwig (1980) suggested that analysis of the way in which adult-child dyads carry out tasks requiring strategic skills can result in better understanding of the origins and development of these skills. Pellegrini, Brody, and Sigel (1985) suggested that the level of support provided by a parent during interaction with a child in a problem-solving task can be considered an indicator of a child's competence.

A variety of observational methods have been used in studies of parent-child interaction. Some studies used rating scales to give an over-all assessment of particular aspects of the parent's and/or the child's behavior (Estrada, Arsenio, Hess, & Holloway, 1987; McGowan & Johnson, 1984), while other studies used more intricate behavioral-interaction coding systems (McGillicuddy-DeLisi, 1985; Pellegrini et al., 1985, 1986). The intricate codes ranged from codes with global categories to codes with very minute categories. Some of the studies used time-sampling methods, while other studies used event-sampling. Additionally, Dowdney, Mrazek, Quinton, & Rutter, (1984) and Mrazek, Dowdney, Rutter, & Quinton (1982) used a combination of time and event-sampling. Frequencies and rates of behavior were the

most often reported summary statistics. Fewer studies were reported that used analysis of sequential patterns of interaction, although recent literature suggested the need for further research in this area (Dowdney et al., 1984; Mrazek et al., 1982; Pellegrini et al. 1985, 1986). The need to explore changes in patterns of parent-child interaction through time was noted by Aldous (1977), Cairns (1979), and Feiring and Lewis (1978).

#### Appropriate Use of the Code

The Parent-Child Interaction Code is intended for use in coding observations of time-dubbed video-recordings of parent-child interaction. The parent's and the child's behaviors are coded in separate viewings of each video-recorded session, using the same set of behavioral descriptors. The type of interaction setting most appropriate for application of the code is a problem-solving task situation in which parent and child have the opportunity to be mutually involved with each other and with the task.

#### Description of the Code

The code includes 18 mutually exclusive and exhaustive behavioral descriptions and was designed to account for verbal behaviors, and in the absence of verbal behaviors, the non-verbal behaviors, of parents and children. Observers code the verbalized content of each utterance. The non-verbal behavior descriptors are used only when there are no accompanying verbal behaviors.

A procedure similar to that described by Cooper, Grotevant, and Condon (1982) should be employed in defining utterances. They identified utterances as corresponding roughly to sentences. Independent clauses were separated whenever possible but never from clauses connected to them by subordinating conjunctions. Comments such as "yes," "no," and "un-hun" were considered separate units because of the salience of their interactional content. For the present code, unless comments such as "o.k." or "alright" were followed by a pause, they were considered part of the utterance they immediately preceded.

One observer transcribes the verbal behavior and unitizes the behaviors by noting the on-set times (in seconds) of verbal and non-verbal behavioral changes. Subsequent observers use the unitized transcript in coding the behaviors occurring in the interaction situation.

Because the on-set of one behavior indicates the off-set of the preceding behavior, it is possible to obtain both frequency and duration measures for behaviors of parents and children. The assessment of non-verbal behaviors and of behavioral durations are particularly important in assessing the behavioral changes of parents and/or children who have a low level of verbal behavior in the parent-child interaction situation.

The coded observations of parent and child obtained in separate viewings of a video-recorded session also can be merged and behavioral contingencies can be obtained using a statistical program developed by

Conger and Sung (1988). Behavioral contingencies provide the potential for analysis of behavioral interaction that goes beyond the use of frequencies and durations and allows for analysis of sequential patterns of interaction.

## Parent-Child Interaction Code

### Directions

Use the following descriptors to code the behaviors of parent and child in separate viewings of each videotape. Use the nonverbal behavior descriptors only when there is no accompanying verbal behavior; otherwise, code only verbal behavior. When coding verbal behavior, code the verbalized content of each utterance; use tone of voice and nonverbal behavior to aid in clarifying the verbal behavior. When coding nonverbal behavior, code each action. For each behavior (nonverbal or verbal), indicate time of "on-set". Verbalizations and actions relative to the problem-solving task, the self, or the other person that are focused on solution of the problem-solving task are considered to be task-related. These may include comments about the over-all progress in the task situation. See the decision rules and examples for further explanation of the various code categories. The behavioral descriptor are numbered to facilitate recording of behavioral observations.

### Nonverbal Behavioral Descriptors

Acceptance (11). Obvious physical demonstration of compliance, acceptance, approval or affection (e.g., hug, pat, clap hands). Also includes head nods and smiles.

Rejection (12). Obvious physical demonstration of non-compliance, resistance, rejection, disapproval, force, restraint, or hostility (e.g., pout, sulk, pull-away, hit, shove, push, kick). Also includes shake head "no" and frown.

Onlook (attend/watch) (13). Observing the other person when that person is actively manipulating/touching the puzzle or puzzle pieces so as to solve the puzzle, but not actively manipulating puzzle pieces oneself.

Structure (point/show) (14). Pointing or motioning toward a particular puzzle piece or location with finger or hand. Holding out a puzzle piece for the other person to take. Moving hand to illustrate a way to do the puzzle without actually holding a puzzle piece. Demonstrating a particular action by moving a puzzle piece.

Assist (mutual involvement) (15). Both persons are actively involved in manipulating/touching puzzle or puzzle piece(s) in a manner so as to solve the puzzle.

Direct (intrude) (16). Actually moving or taking the other person's hand in such a manner so as to obviously physically direct the other person's manipulation of the puzzle or puzzle pieces.

Takeover (do) (17). Focal person does task while other person's hand is not actively manipulating/touching puzzle or puzzle piece(s).

Other task-related behaviors (18). Task related behaviors that do not fall into any of the above descriptors but occur while both persons are involved in the puzzle task. Includes pausing to look at and/or listen to other person, waiting for the other person to respond, glances at the other puzzle, and hesitating for a period during manipulating of the puzzle or puzzle pieces.

Off-task nonverbal behaviors (19). Looking away or other non-task related physical activity. Includes glances at clock or camera.

### Verbal Behavioral Descriptors

Favorable (21). Utterances that show support, approval, acceptance, affirmation, agreement, compliance, praise, encouragement, elation, and favorable acknowledgement, as well as giggle and laugh.

Unfavorable (22). Utterances that show disapproval, rejection, disagreement, resistance, criticism, discouragement, frustration, and unfavorable acknowledgement, as well as cry and whine.

Dependency bid (23). Direct and indirect seeking of task assistance and/or personal approval, affirmation, & attention through an emotional appeal. Suggests an inability to perform the task. Includes "me" oriented or related statements.

Directive command (24). Task-related nonquestion-suggestion stated in imperative form. Implies or tells listener what to do. Initiates action and/or specifies a particular course of action; includes redirection and direct verbal modeling.

Question-suggestion (25). Task-related request/suggestion stated in interrogative form. Uses question form to suggest or imply a course of action.

Inquiry/information-seeking (26). A direct request for information or clarification stated in a neutral manner. A non-action motivating inquiry. Speaker does not have a pre-conceived notion regarding desired action.

Statement/information-giving (27). Task-related comment presented in declarative form that provides information, offers an explanation, or presents a statement of fact in a neutral or

descriptive manner.

Ambiguous utterances (28). Includes utterances such as blurps, word fragments or sentence fragments that cannot be otherwise categorized.

Off-task verbal utterances (29). Directives, question-suggestions, inquiries, statements, favorable, and unfavorable utterances that are non-task related (i.e., not focused on solution of the puzzle). Includes comments about the clock or camera and comments to persons other than the person(s) in the task situation.

### Examples of Parent-Child Verbal Behaviors

#### Favorable (21).

Yes.  
 O.K.!  
 Good job!  
 You did it.  
 That's the way.  
 I bet that will work.  
 You're going to find the right spot.  
 This is fun.  
 We're really going to get this.  
 We've already found spots for three pieces.  
 We're almost finished.  
 We don't have very many left.  
 We'll be done soon.  
 You got it!

#### Unfavorable (22).

No.  
 It doesn't go there.  
 It didn't fit that way.  
 That's not right.  
 That won't work.  
 This is hard to do.  
 You've already tried that spot.  
 We'll never get finished in time.  
 We've only got one so far.  
 This is dumb.  
 Don't do that.  
 Stop doing that.  
 I don't want to do this anymore.  
 I'm going to quit.  
 Don't help me.  
 I can't do this.  
 You did these wrong.

Don't push on it so hard.

Dependency bid (23).

Help me.  
Help me do this.  
I can't do this myself.  
I need your help.  
We're supposed to do this together.  
Watch me try this place.  
Do you want me to help?  
Do you want me to find where that one goes?  
Aren't you going to help me?  
You've got to do this, too.  
This is for both of us to do.

Directive command (24).

Let's start.  
You choose how to begin.  
You try it now.  
Let's try something else.  
You do this half.  
Try something different.  
Start on the top.  
Try another place.  
Try another piece.  
Try that one.  
Let's try the corner.  
Let's see where this circle fits.  
Try that triangle in the corner.  
Turn the piece one more time.  
Turn it again so it'll go right on.  
Put it over there.  
Turn it like this.  
Put it in the corner.  
Let me do it.  
Do this piece.

Question-suggestion (25).

Do you want to start?  
Have you tried all the places?  
Where else do the circles go?  
Can you think of another way?  
What about the corner?  
Shall we try this piece?  
What about this place?  
Have you tried this triangle?  
Where else could you put that piece?  
How else could you turn the circle?



Have we tried this piece?  
 Could you try the corner?  
 How about trying that piece on the bottom?  
 Do you think this circle would fit here?  
 Have you tried this circle there?  
 Why don't you try the other triangle there?  
 Would you like to try it here?  
 Does it fit there?  
 How about this piece?

Inquiry/information-seeking (26).

Why?  
 What do you think?  
 How shall we do this?  
 What else could we try?  
 Where shall we start?  
 How many circles do we have left?  
 What shape is this?  
 Where are the circle places?  
 When did you put that circle there?  
 How can I get this circle to fit here?  
 Do you think it will fit there?  
 Can you get it?  
 Do you know how to do this?  
 Where shall we try this one?  
 Who should go first?  
 Do you think this is the right place?

Statement/information-giving (27).

If it's right, it'll slide right on.  
 This puzzle is different than the first one.  
 Each piece is different.  
 I think I'll try this circle.  
 These are the circle places.  
 We have these two triangles left.  
 I'll try this piece over here.  
 This piece fits on only in this way.  
 This piece might fit there.  
 Triangles go in the top corners.  
 You have to push it all the way down.  
 We have to use all three pegs.  
 The triangle goes in the middle.  
 Maybe it fits a different place.  
 It fits on this way.  
 Remember - you have to try different ways.

### Decision Rules

The following decision rules are presented in order to clarify the various verbal behavioral descriptors of the parent-child interaction code.

1. If an utterance (e.g., "OK") is merely tacked onto the beginning or the end of a directive, question-suggestion, inquiry, or statement, code utterance as a directive, question-suggestion, inquiry, or statement (i.e., "OK, try another place" - code as a directive). If utterance is a response only, code as an verbal affect display (i.e., "OK!" - code as favorable; "That won't work" - code as unfavorable).
2. If two separate units are evident, code each unit separately (i.e., "No, try another place" - code first unit as an unfavorable response and second unit as a directive. Furthermore, "No. That won't work" is considered two units and both units are coded as unfavorable).
3. Information-giving (statements) differ from directives. Statements are factual/informative references to a fact or to an intended course of action on the part of the speaker. Directives imply or overtly suggest the listener follow a particular course of action.
4. Information-giving (statements) differ from question-suggestions. Statements provide information/facts in a nonquestioning manner. Question-suggestions use an interrogative form and indicate a course of action the listener might consider following.
5. Information-giving (statements) differ from favorable and unfavorable utterances. Statements provide neutral information. Favorable and unfavorable reactions imply or overtly suggest a value judgement on the part of the speaker. Tone of voice may aid in differentiating statements from favorable or unfavorable utterances.
6. Directive commands differ from question-suggestions. Directives state or imply the necessity for the listener to follow a particular course of action. Question-suggestions merely indicate a possible course of action the listener could follow.
7. Dependency bids differ from question-suggestions. Dependency bids are an emotional appeal to the listener for help, attention, approval, etc.; they convey a "dependence-seeking" quality. Dependency bids solicit some response or action based upon the "personal appeal" of the speaker. Question-suggestions suggest the listener follow a particular course of action, but this course of

- action does not involve giving the listener personal attention, approval, etc. motivated by dependency-seeking.
8. Information-seeking (inquiries) differ from question-suggestions. Information-seeking refers to direct requests for information. They do not imply the listener should follow a particular course of action. Question-suggestions are stated in interrogative form, but point out a course of action the listener may choose to follow.
  9. Unless the nonverbal behaviors "onlook" (13), "assist" (15), "direct" (16), "take-over" (17) last for at least one second, do not code. However, do code "point/show" (14) and "direct" (16) even if occurring momentarily (less than an entire second).
  10. Verbal behavior takes precedence over nonverbal behavior. If both verbal and nonverbal behaviors occur in a given time interval (second), for example, the utterance "No" (21) followed by a "point/show" (14), code the verbal behavior rather than the nonverbal behavior for that particular time interval. If the nonverbal behavior (but not the verbal behavior) continues into the next time interval, the nonverbal behavior should be coded as occurring in this interval.
  11. If two verbal behavioral units occur in a given time interval (second), and the second behavioral unit carries over into the next time interval, attribute the first behavioral unit to the first time interval and the second behavioral unit to the next time interval. Otherwise, code the first behavior only.
  12. Use "ambiguous utterance" (28) or "other non-task related utterance" (29) to code audio portions of the tape that do not fall into any other descriptors, cannot be understood, or contain word fragments not classifiable into any other category. If the audio portion is difficult to understand, differentiate between (28) and (29) on the basis of the individual's nonverbal behavior accompanying the utterance.
  13. Verbal references to the other (practice) puzzle should be coded as one of the seven task-related utterances that most accurately reflects the content of the utterance; nonverbal behaviors related to the other puzzle (i.e., glances at the puzzle) should be coded as "other task-related behaviors" (18). These behaviors reflect attempts at solving the puzzle-task.
  14. Verbal references to time should be coded as off-task utterances (29); nonverbal behaviors related to time (i.e., glances at the clock) should be coded as off-task behaviors (19). These behaviors

should not be considered task-related actions; they do not reflect attempts at solving the puzzle-task.

15. Nonverbal affect codes (11 and 12) take precedence over nonverbal task-related codes (13 through 18).
16. When in doubt between "onlooking" (13) and "assist" (15), code as "onlooking" (13). "Assist" (15) should be obvious involvement of both persons in the manipulation of puzzle pieces or solution of the puzzle.

#### Scoring

The score sheet for use with the Parent-Child Interaction Code contains space for recording the time (in seconds) of behavioral changes, the focal subject (person being observed), the behavioral descriptor number, and the transcribed verbalizations.

## Application of the Code

### Definition of Derived Behavior Categories

The original 18 behavioral descriptors define fairly minute types of behaviors. It is possible to perform statistical analyses using the behavioral descriptors or to group the behavioral descriptors into larger units for purposes of statistical analysis. The computer program developed by Conger and Sung (1988) provides the option of obtaining analyses on the original behavioral descriptors, as well as analyses on derived categories of behaviors. For example, in a study of parent-child interaction (Melby, Pease, & Conger, 1988), the 18 behavioral descriptors of the Parent-Child Interaction Code were collapsed into 6 categories to yield information on type of affect (positive, negative) and level of directiveness (high, medium, low), as well as information about the amount of off-task behaviors displayed by the mothers as shown in Table 1. Affective behaviors were defined as behaviors expressing like vs. dislike and demonstrating emotions. Directive behaviors were defined as instrumental behaviors that facilitated action and provided information. The 6 categories were based upon information from research regarding maternal affect and directiveness (Bee et al., 1982; Conger et al., 1986; Hess & Shipman, 1965, 1968; McGillicuddy-DeLisi, 1985; Skinner, 1965).

The 6 derived behavior categories included: Positive affect included verbal and nonverbal behaviors that indicated acceptance, approval, support, affirmation and favorable acknowledgement. Negative

Affect included behaviors that indicated disapproval, rejection, disagreement, criticism, unfavorable acknowledgement, and emotional appeals for assistance. Low Directiveness included watching the other person manipulate puzzle pieces, pausing, and providing information but not actively intervening in the child's activities. Medium Directiveness included mutual involvement in manipulating puzzle pieces and asking questions to suggest a course of action. High Directiveness included pointing toward a particular puzzle piece, actually moving the other person's hand, manipulating puzzle pieces while the other person watched, and telling the other person what to do. Off-task Behavior included verbal and nonverbal behaviors that did not contribute to the solution of the puzzle.

Research Application of the Parent-Child Interaction Code: An Example

In the study of parent-child interaction by Melby, Pease, and Conger (1988), 52 mother-child dyads were observed when the children were age 3-years and again when the children were age 4-years. Two observers independently coded the initial 4-minutes of the video-recorded interaction using the 18 behavioral descriptors of the Parent-Child Interaction Code. Order of observation of video-tapes was randomized across dyads and across the two years. All behavioral coding was done using time-dubbed video-tapes. To aid in unitization of behavior, the first observer transcribed the verbalizations of the mother, noted the on-set time (in seconds) of verbal behavior changes

and, in the absence of verbal behaviors, the on-set time of nonverbal behavior changes. The first observer then assigned one of the 18 behavioral descriptors to each change in behavior. The second observer used the prepared transcripts (verbalizations and on-set times, but not behavioral descriptors) to code maternal behavior. The assessments of observer agreement and reliability for the Parent-Child Interaction Code (18 behavioral descriptors and 6 derived behavior categories) that are reported below were obtained from this study.

#### Observer Agreement and Reliability

Computation of observer agreement and reliability. The methods used in assessing interobserver reliability of the behavioral observations were based on those suggested by Hartmann (1977). Hartmann pointed out that it is necessary to obtain the reliability of the unit of behavior (session scores) which is subsequently analyzed. He maintained that although percent agreement on trial scores (the per cent of total observations the observers agreed for each trial) is frequently used in estimating reliability of observational data, more stringent and appropriate estimates of the reliability of session scores include: effective percentage agreement for occurrences (the percentage of occasions in which both observers agreed that the target behavior occurred), the correlation coefficient (the product-moment correlation based on the paired scores provided by the two observers for the sessions that are jointly observed), and Cohen's kappa (the proportion of observed agreements, corrected for chance agreements).

Frequencies, durations, effective percent agreement, and Cohen's kappa scores for the 18 behavioral descriptors and the 6 derived behavior categories were obtained using a computer program developed by Conger and Sung (1988). Because this program calculates effective percent agreement on a second-by-second basis, the EPA statistic is reported only for the duration measures.

Observer agreement for 18 behavioral descriptors.

Observer agreement for mothers. The mean kappa coefficient across all 104 observation sessions for all mothers and all 18 behavioral descriptors was .86 (see Table 2), well within the range of acceptable values (Bakeman & Adamson, 1984; Hartmann, 1977). The correlations between the session scores of the two observers, based on one score for each behavioral category for each of the 104 sessions for each observer, with the exception of one correlation of .40, ranged from .69 to .98 with a mean of .88 (see Table 2). Effective percent agreement (EPA) for the 18 behavioral descriptors ranged from .49 to .99 with a mean of .77. These findings suggest the presence of basic agreement in observational coding by the two observers (Hartmann, 1977).

Observer agreement for children. The mean kappa coefficient across all 104 observation sessions for all children and all 18 behavioral descriptors was .89 (see Table 3). The correlations between the session scores of the two observers (summing across observation categories and sessions for each observer) for the 18 behavioral descriptors, with the exception of one correlation of .43, ranged from .61 to .99 with a mean



of .87. Effective percent agreement (EPA) for the 18 behavioral descriptors ranged from .66 to .92, with a mean of .80.

#### Observer agreement for the 6 derived behavior categories

Observer agreement for mothers. The mean kappa coefficient across all 104 observation sessions for all mothers and all 6 behavior categories was .86 (see Table 4). The correlations between the session scores of the two observers (summing across observation categories and sessions for each observer) for the 6 observation categories ranged from .82 to .98 with a mean of .93. Effective percent agreement (EPA) for the 6 categories ranged from .67 to .84 with a mean of .79.

Observer agreement for children. The mean kappa coefficient across all 104 observation sessions for all children and all 6 behavior categories was .90 (see Table 5). The correlations between the session scores of the two observers (summing across observation categories and sessions for each observer) for the 6 observation categories ranged from .86 to .99 with a mean of .95. Effective percent agreement (EPA) for the six categories ranged from .79 to .91, with a mean of .90.

#### Summary of Observer Agreement Results

The results of analysis of the two observer's scores indicated that the reliability findings are well within the range of acceptable values (Bakeman & Adamson, 1984; Hartmann, 1977). These findings suggest the presence of basic agreement in observational coding by the two observers using the Parent-Child Interaction Code.

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Table 1

Behavioral Categories and Associated Verbal and Nonverbal Behavioral Descriptors

Behavior categories	Behavioral descriptors	
	Verbal	Nonverbal
Positive Affect	Favorable (21) (e.g., praise, support)	Accept (11) (e.g., hug, smile)
Negative Affect	Unfavorable (22) (e.g., criticism, disagreement) Dependency bid (23)	Reject (12) (e.g., shake head, push)
Low Directiveness	Statement of information (27)	On-looking (13) Other task-related behavior (18) (e.g., pause, listen)
Medium Directiveness	Question-suggestion (25) Inquiry/information seeking (26)	Mutual involvement (15)
High Directiveness	Command (24)	Structure (14) (e.g., point, show) Intrude (16) Take-over (17)
Off-task Behavior	Ambiguous utterance (28) (e.g., blurrp, fragment) Off-task utterance (29)	Off-task nonverbal (19)



Table 2

Interobserver Agreement (Correlations and Effective Percent Agreement)  
for Maternal Behavioral Descriptors (Yr 1 and Yr 2) (n=52)

Behavioral descriptors	Interobserver Agreement							
	Yr 1 scores				Yr 2 scores			
	Frequency		Duration		Frequency		Duration	
	<u>r</u>	EPA	<u>r</u>	EPA	<u>r</u>	EPA	<u>r</u>	EPA
Nonverbal descriptors:								
Accept	.85	--	.81	.88	.95	--	.91	.97
Reject	.86	--	.87	.73	.94	--	.83	.99
Onlook	.96	--	.98	.82	.95	--	.96	.85
Structure	.92	--	.72	.61	.69	--	.87	.69
Assist	.90	--	.96	.72	.97	--	.98	.80
Direct	.73	--	.81	.83	.40	--	.70	.87
Takeover	.97	--	.98	.82	.97	--	.96	.84
Other task-related	.87	--	.87	.59	.88	--	.85	.75
Off-task	.97	--	.97	.77	.97	--	.97	.85

Note 1. Kappa Yr 1 = .85; Kappa Yr 2 = .87.

Note 2. Over-all means:  $\bar{r}$  = .88, EPA = .77.

Note 3. Effective Percent Agreement (EPA) was computed on a second by second basis and, thus, is reported only for duration measures.

Table 2, cont.

Behavioral descriptors	Interobserver Agreement							
	Yr 1 scores				Yr 2 scores			
	Frequency		Duration		Frequency		Duration	
	<u>r</u>	EPA	<u>r</u>	EPA	<u>r</u>	EPA	<u>r</u>	EPA
Verbal descriptors:								
Favorable	.85	--	.82	.75	.90	--	.91	.80
Unfavorable	.95	--	.94	.83	.97	--	.95	.86
Dependency bid	.89	--	.88	.81	.94	--	.95	.93
Directive command	.97	--	.96	.85	.96	--	.95	.86
Question-suggestion	.93	--	.96	.76	.95	--	.96	.71
Inquiry/ information seek	.74	--	.76	.49	.75	--	.78	.61
Statement of information	.85	--	.89	.70	.89	--	.98	.72
Ambiguous utterance	.71	--	.70	.51	.78	--	.77	.63
Off-task utterance	.98	--	.98	.78	.99	--	.99	.83

Table 3

Interobserver Agreement (Correlations and Effective Percent Agreement)  
for Children's Behavioral Descriptors (Yr 1 and Yr 2) (n=52)

Behavioral descriptors	Interobserver Agreement							
	Yr 1 scores				Yr 2 scores			
	Frequency		Duration		Frequency		Duration	
	$\underline{r}$	EPA	$\underline{r}$	EPA	$\underline{r}$	EPA	$\underline{r}$	EPA
Nonverbal behavior:								
Accept	.97	--	.98	.91	.94	--	.87	.88
Reject	.92	--	.75	.79	.95	--	.94	.83
Onlook	.92	--	.94	.74	.96	--	.94	.81
Structure	.87	--	.79	.82	.86	--	.76	.84
Assist	.97	--	.99	.86	.98	--	.99	.86
Direct	--	--	--	--	--	--	--	--
Takeover	.97	--	.99	.92	.97	--	.95	.93
Other task-related	.93	--	.92	.75	.94	--	.98	.82
Off-task	.97	--	.99	.88	.96	--	.90	.89

Note 1. Kappa Yr 1 = .88; Kappa Yr 2 = .90.

Note 2. Over-all means:  $\underline{r}$  = .87, EPA = .80.

Note 3. Effective Percent Agreement (EPA) was computed on a second by second basis and, thus, is reported only for duration measures.

Table 3, cont.

Behavioral descriptors	Interobserver Agreement							
	Yr 1 scores				Yr 2 scores			
	Frequency		Duration		Frequency		Duration	
	<u>r</u>	EPA	<u>r</u>	EPA	<u>r</u>	EPA	<u>r</u>	EPA
Verbal behavior:								
Favorable	.94	--	.94	.84	.89	--	.93	.84
Unfavorable	.94	--	.94	.84	.93	--	.73	.83
Dependency bid	.86	--	.95	.89	.75	--	.73	.78
Directive command	.85	--	.84	.72	.69	--	.72	.70
Question-suggestion	.43	--	.50	.71	.61	--	.84	.61
Inquiry/ information seek	.77	--	.79	.81	.75	--	.89	.81
Statement of information	.81	--	.84	.66	.89	--	.88	.69
Ambiguous utterances	.73	--	.65	.68	.90	--	.88	.74
Off-task utterance	.98	--	.98	.81	.95	--	.94	.81

Table 4

Interobserver Agreement (Correlations and Effective Percent Agreement)  
for Maternal Behavior Categories (Yr 1 and Yr 2) (n=52)

Behavior category	Interobserver Agreement							
	Yr 1 scores				Yr 2 scores			
	Frequency		Duration		Frequency		Duration	
	r	EPA	r	EPA	r	EPA	r	EPA
Positive affect	.86	--	.82	.75	.91	--	.91	.81
Negative affect	.92	--	.91	.82	.97	--	.90	.86
Low directiveness	.93	--	.97	.80	.92	--	.90	.84
Medlum directiveness	.94	--	.96	.84	.98	--	.96	.84
High directiveness	.95	--	.94	.83	.95	--	.81	.83
Off-task behavior	.98	--	.98	.67	.99	--	.98	.73

Note 1. Kappa Yr 1 = .86; Kappa Yr 2 = .87.

Note 2. Over-all means:  $r = .94$ , frequency;  $r = .93$ , duration; EPA = .84.

Note 3. Effective Percent Agreement (EPA) was computed on a second by second basis and, thus, is reported only for duration measures.

Table 5

Interobserver Agreement (Correlations and Effective Percent Agreement)  
for Children's Behavioral Categories (Yr 1 and Yr 2) (n=52)

Behavior category	Interobserver Agreement							
	Yr 1 scores				Yr 2 scores			
	Frequency		Duration		Frequency		Duration	
	$\underline{r}$	EPA	$\underline{r}$	EPA	$\underline{r}$	EPA	$\underline{r}$	EPA
Positive affect	.96	--	.96	.83	.91	--	.86	.81
Negative affect	.94	--	.88	.79	.94	--	.89	.82
Low directiveness	.97	--	.96	.82	.97	--	.88	.85
Medium directiveness	.96	--	.99	.86	.99	--	.97	.85
High directiveness	.94	--	.99	.91	.99	--	.97	.91
Off-task behavior	.99	--	.99	.81	.97	--	.98	.84

Note 1. Kappa Yr 1 = .90; Kappa Yr 2 = .90.

Note 2. Over-all means:  $\underline{r}$  = .96, frequency;  $\underline{r}$  = .94, duration; EPA = .94.

Note 3. Effective Percent Agreement (EPA) was computed on a second by second basis and, thus, is reported only for duration measures.