MATERNAL INFLUENCES ON INFANT COGNITION DURING THE SECOND YEAR

by

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ABSTRACT

The study was undertaken to examine the effects of maternal caretaking upon infant cognitive development. An attitude questionnaire, observations of mothers in a standardized situation, and a home environment assessment were used as measures of maternal caretaking practices. Infant cognitive development was assessed by means of a language test, a test of psychological development, a test of hypothesis formation, and an observation of infants in a standardized play situation.

Sixty-eight mothers and their infants were evaluated once prior to the infants' first birthday and again prior to the infants' second birthday. Scores of infants whose mothers performed well on the maternal caretaking measures were compared with the scores of infants whose mothers performed poorly on the maternal caretaking measures. Some evidence was found to lend support to Burton White's hypothesis that the period between ten and eighteen months of age is critical for the cognitive development of infants. However, the overall lack of consistent significant findings make any conclusions tenuous. Possible explanation for the results of the study are discussed.

CHAPTER 1

INTRODUCTION

Research suggests that experiences during the first three years of life have a profound effect upon the development of cognitive ability. Studies of orphanage-reared infants, typically raised in sterile, unstimulating environments, have revealed deficits in cognitive development (Gilliland, 1949; Dennis and Najarian, 1957; Kohen-Raz, 1968). The inability of interventions such as Head Start to facilitate significant gains in intellectual functioning in four and five year olds (Hess and Baer, 1968; Helmuth, 1969) has also pointed to the importance of the first three years of life in the development of cognitive functioning. In contrast to Head Start, several intervention programs (Caldwell and Richmond, 1968; Honig, 1973; Gordon, 1969; Weikart and Lambie, 1970) directed toward infants three years of age and younger have been successful in producing gains in cognitive ability. Related to these findings is Bloom's (1965) hypothesis that 50% of adult intelligence is formulated by the age of four and that the environment has its greatest impact upon cognition prior to this age.

As the primary caretaker during the first three years, the mother plays a dominant role in the development of her child. An impressive array of evidence has accumulated documenting the effect of maternal caretaking upon infant cognitive development. Hess and Shipman (1965), Bishop and Chace (1971), and Tulkin and Kagan (1972) have shown that the maternal use of language has a significant effect upon later performance. Other studies reveal the importance of maternal affective behavior to cognitive development. Frequency of maternal play with a child has been found to correlate with later performance (Hess and Shipman, 1965; Bishop and Chace, 1971; Collard, 1971; Minuchin, 1971). Hunt (1965), Watson (1966), and Lewis and Goldberg (1969) all speak of the mother's ability to establish in her infant contingency awareness or a belief that one's actions can affect the environment -- a precondition for later learning. Collard (1971), in a study of infants eight to thirteen months of age, found active exploration which could be significantly influenced by different maternal or environmental caretaking practices. The importance of early exploration upon later cognitive functioning has been suggested by several investigators (Bruner, 1973; Hunt, 1967; Lewis, 1967; Kagan, 1971).

All of the findings point to the early importance of maternal caretaking practices upon cognitive development in infants. Burton White (1972) believes that the

mother's direct and indirect actions with regard to her child are especially important for cognitive growth during the second year of life. Around the age of one year, new developments occur in infants which place greater demands upon the primary caretaker. There is an increased capacity for receptive language, greater locomobility, a strong orienting tendency toward the mother or caretaker and an awareness of independent identity apart from the mother or caretaker. How the mother reacts and adjusts to these new developments, in White's conceptualizations, determines in large measure the infant's ability to develop cognitively. In studying infants exposed to widely differing caretaking environments, White found few cognitive differences at 12 months, but increasingly greater divergences on various measures of cognitive ability as age increased. As a result of this data and that of Kagan (1971), Gordon (1971) and Wachs, Uzgiris and Hunt (1971), who found developmental differences in infants from different social class backgrounds beginning to emerge near 12 months of age, White hypothesized that the period between 10 and 18 months is critical for the development of cognitive ability and is especially sensitive to maternal influences.

The present research was undertaken to investigate the effects of maternal caretaking as measured in

several ways upon infant cognition during the second year of life. It also serves as a test of White's critical period hypothesis. Before describing in detail the methodology utilized, methods for assessing maternal care-taking will be discussed, and reasons for employing the particular instruments used in this study will be given.

CHAPTER 2

ASSESSMENT

Assessment of Maternal Caretaking Practices

In order to provide a variety of assessment techniques and to take advantage of what has been proven effective in the past, three methods of assessing maternal caretaking practices were chosen for inclusion in the study. The three methods used were attitude assessment, controlled behavioral observation, and home visitation observation.

Attitude Assessment

Extensive use has been made of the attitude questionnaire in the assessment of the parent-child interaction. Usually use of such instruments is predicated upon the assumption that attitudes are related to observable aspects of the parent-child interaction. Although one of the easiest assessment devices to administer, there has been research (Becker and Krug, 1965) to indicate that some attitude instruments do not predict behavior very well. Rather than rely upon any existing attitude assessment device, a questionnaire (QNR) was devised for use in the research, in order to examine the

relationship of maternal attitudes to both infant performance on cognitively related activities and other measures of maternal caretaking.

The questionnaire was composed of items designed to tap maternal attitudes in three basic areas:

1. The use of reward and punishment.
2. The importance of verbal stimulation and freedom to explore.
3. The amount of influence the mother feels she has on her infant's cognitive growth and on her ability to control her environment.

Because most subjects were to be drawn from lower socioeconomic strata, the syntax and terminology of the questionnaire were simplified as much as possible. Items concerned with the use of reward and punishment were adopted from several similar items in an attitude scale devised by Martin (1970). Items concerned with vocalization and play were created on the basis of such behaviors as described by Caldwell (1972) and Bishop and Chace (1971). Items related to the concept of control of one's own reinforcers and destiny versus chance were selected and simplified from Rotter's Internal-External Scale of 1966. This last category of items was included in part because research indicates (Lewis and Goldberg, 1969) that lower socioeconomic groups such as were involved in this study show less internality than higher

SES groups. As Badger (1971) notes, mothers in lower SES groups doubt that they can learn ways to affect their child's intellectual and language competency.

Behavioral Observation

There has been considerable debate over the relative merits of observing the parent-child interaction in the natural environment versus observation in a controlled laboratory setting. Observations in the home tend to place the mother and infant more at ease and allow for a more representational behavior sample, but suffer from lack of standardization, loss of control over interruptions and elicitation of atypical behavior due to the presence of the observer. Laboratory observations allow control of variables and interruptions and precision in data collection, but often produce anxiety in the mother or infant due to the artificiality of the setting. Because of these considerations, both types of instruments were included in this research.

Behaviors exhibited by mothers toward their infants were directly recorded in a laboratory-type observational setting similar to that proposed by Saxe and Stollak (1971). This measure, called Waiting Room (WR), consists of bringing a mother and her infant into a standard playroom containing chairs and toys and instructing the mother to wait with her infant until the

next phase of evaluation can begin. The mothers are then rated on various behaviors such as smiling, holding, or vocalizing by an unknown observer. A more complete description follows in the method section.

Home Observation

An increasingly greater deal of attention has been devoted recently in attempts to understand better the impact of currently existing natural environments upon infant development. Wachs, Uzgiris and Hunt (1971), using the subtests from the Infant Psychological Scale, constructed by Uzgiris and Hunt (1966), found significant associations between specific environmental characteristics and performance of the infants' tests from 15 months of age and onward. Items that in general reflected intensity of stimulation and amount of verbal stimulation tended to show a correlation with level of child performance. The authors interpreted their findings as supporting Hunt's hypothesis that the proper pattern of stimulation available in the environment must be matched with the developmental level of the child to insure proper responding to a new learning task. To assess and delineate more clearly the kinds of home environments available to infants, several instruments of home observation have been devised recently (Moss, 1967; Yarrow, 1967; Polansky, 1968; Caldwell, Hersher, Lipton, Richmond, Stein, Eddy, Drachman, Rothman, 1963). These

instruments no longer rely upon unstandardized interviews with the mother as the major source of information about maternal behaviors and child care practices which might influence infant cognitive development. They utilize direct observation in natural habitats as means of securing data. For use in this research, the Inventory of Home Stimulation (Caldwell, Heider, and Kaplan, 1966) was selected to sample aspects of the "quantity and quality of social, emotional and cognitive support available" to the young infant. (LRI - the initials signify Living Room Interaction.) The selection of items for this instrument was guided by empirical evidence on importance of certain types of experience for nourishing the development of the child.

Infant Attention

Cohen, Gelber, and Lazar (1971), Kagan (1972) and McCall (1971) all demonstrate evidence which suggests that distribution of attention to environmental events can be related to cognitive functioning in a preverbal child. Infants use higher attentional regard if they are able to detect a difference between incoming stimuli and previously encoded information. Differential regard to the discrepant stimulus could be used operationally as an index of cognitive expectation. Systematically altering the stimulus during the recognition phase should produce information about the coding process.

Lewis (1967) found that the rate at which an infant processes information (gains an expectancy) during short term familiarization tasks can serve as an index of cognitive development. His evidence suggests a direct relationship between rate of habituation (a decrease in responsiveness to incoming stimuli) in infancy and IQ scores at 3 years. The faster the habituation rate, the higher the IQ score. Lewis (1967) and Lewis Goldberg and Raush (1968) found that the amount of response decrement in infants is related to patterns of attention in free play. Thirteen month old infants who habituated rapidly to visual stimuli lost interest rapidly in individual toys and demonstrated more toy changes than infants who demonstrated little response decrement. McCall (1971), surveying infant attention, states that infants who display rapid habituation are more likely to respond to discrepancy with larger increments in attention relative to the standard than are infants who do not indicate rapid habituation.

Relying upon motor and verbal systems as indicators of level of cognitive functioning in infancy does not appear to be fruitful. Charlesworth (1969) suggests that involuntary overt behavior in the form of expressive responses is a superior indicator. These expressive responses include facial expressions, postural changes,

and autonomic responses. Charlesworth theorizes that the amount of expressive behavior is related to the strength of the violated cognitive expectancy. This method of utilizing expressive behavior as a behavioral index of cognitive expectancy was used by LeCompte and Gratch (1972) in object permanence tasks. They found that 18 month old infants reacted with higher surprise reactions and searched more for a missing toy than did 9 month old infants. The younger infants focused on new toys and demonstrated milder surprise reactions.

In sum, the evidence points to the utility of infant responses to discrepant stimuli, habituation rate and expressive behavior in assessing cognitive expectancies and information processing ability in preverbal children. For use in the present research, a Puzzlement Test (PUZZ) was devised based on the procedure reported by Bower (1972). This test consists of a series of tasks in which the infant's expectancies of size, shape, color, and location are systematically violated. Observations and recordings were made of the infant's rate of habituation during redundant presentations of the initial stimulus, increase in looking time to the presentation of the discrepant stimulus and amount of surprise behavior evoked by the presentation of the discrepant stimulus.

Developmental Scales

Developmental quotients in infancy have long been looked upon as nonpredictive of later IQ scores (Bayley, 1965). Recent findings (Ramey, Campbell, and Nicholson, 1973; Willerman, Broman, and Fiedler, 1970; Ireton, Thwing, and Gravem, 1970; Werner, Honzik and Smith, 1968; Goffeney, Henderson, and Butler, 1971; and Willerman, 1972) suggest that the Bayley scales have more predictive validity than previously reported. This is especially true when predicting later IQ from infants with low IQ and low SES or testing infants with high likelihood of abnormality. Generally, researchers and interventionists have been disappointed in the lack of predictability of the Bayley and other infant tests. Wachs, Uzgiris and Hunt (1971) attribute the failure of IQ, DQ and MA scores to show the relationship of socioeconomic status and early intellectual functioning to the collapsing of heterogeneous processes and abilities into a single score. The single score tends to conceal variations in the central processes rather than reveal them. Like other researchers, they also conclude that the traditional scales did not include enough subjects from below the upper-lower class in their sampling procedure.

A promising area of assessment has been the development of scales based on Piagetian theories of cognitive development (DeCarie, 1965; Uzgiris and Hunt,

1966; Escalona and Corman, 1968). This type of measurement taps sequentially organized areas of capability and their inter-relationships. These scales objectively separate infants along continua representing specific abilities.

Infant development was assessed by the Infant Psychological Development Scale (IPDS). Previous research (Uzgiris and Hunt, 1966) on this instrument has shown it to have adequate inter-observer reliability, adequate test-retest reliability and the significant degree of scalability required by a Piaget-type ordinal measure.

Honig and Brill (1970) used the Piagetian scales to evaluate an infant intervention program. Developmental gains favoring the experimental group were achieved on the Object Permanence Scale and the Development of Means-Ends Relationship at age 12 months.

Though predictive validity has yet to be established with IQ at later ages and with school performance, the fact that certain subscales differentiated between disadvantaged and middle class levels suggests concurrent validity for this measure. Evidence for the construct validity of the IPDS has also appeared in a comparison study between normal and retarded children performance on the instrument (Wachs, 1970).

For use in this research, it was decided to employ the Development of Means, Vocal Imitation, and Causality subscales of the IPDS.

Language Differences in Infancy

Language is an important factor in school success. The verbal comprehension subtest of the Thurstone Primary Mental Abilities Test is the best single predictor of reading achievement (Werner, Simonian, and Smith, 1967). Minor (1957), in a review paper, states that vocabulary is the best single predictor of both academic and occupational achievement. Investigators (Bernstein, 1961; Hess and Shipman, 1965) have linked slower rates of cognitive development of children from poverty backgrounds to maternal behavior and teaching style. Eveloff (1971), in a review of the relationship between language development and the mother-infant attachment bond, claims the first 18 months are crucial for symbolic language development. He feels that future communication with others and with one's self rests on the early development of language skills. Wachs, Uzgiris, and Hunt (1971) found that psychological development was related to "stimulus bombardment" and "the opportunity to hear vocal signs for specific objects, actions, and relationships."

White (1972), Honig and Caldwell (1966), and Bzoch and League (1970) have all developed receptive language

scales that hold much promise for comparing language comprehension in preverbal infants. Because of the bilingual language environments of the infants in our subject population, the Bilingual Receptive Language Inventory (BRLI) was selected to measure language ability in the 15 to 20 month age range. This test is designed to measure the receptive language of monolingual or bilingual (Spanish-English) children between 12 and 36 months of age. Part I of the Inventory measures the language ability of children between 12 and 24 months of age. The assessment of two linguistic systems in the same instrument is based on the assumption that grammatical acquisition follows a definite developmental sequence. The instrument was designed to meet the needs of a Parent-Child program in Houston serving primarily Mexican-American poverty level families. Normative data on the test is forthcoming; however, the instrument itself has application for comparison purposes. The test has been shown to have adequate inter-observer reliability and test-retest reliability (Mazeika, 1972). The predictive validity of this instrument can only be established after children enter school or are tested with standardized IQ tests after three years of age. Though this instrument is new, it appears to be the best available measure of receptive and expressive language ability in the literature. It is especially

appropriate for assessing the language skills of a bilingual population.

Exploration and Cognitive Development

White (1972) found a predominance of nonsocial tasks in one to two year old infants. Activities such as exploring, mastery and gaining information through visual observation occupy the major portion of the child's day. Bruner (1973), in discussing the organization of early skilled action in infancy, suggests that mastery play is crucial for development during the first year or year and a half. Mastery play is playful means-ends matching. An infant uses his newly acquired skilled routines in pleasure-giving variations on as many different objects as available or he fits a new object into as many routines as available. Play has the effect of maturing some modular routines for later incorporation in more encompassing programs of action. Hunt (1967) emphasizes that maximal development occurs when experiences are being slightly discrepant from the child's own level of functioning. This suggests the importance of environments that are both supportive and challenging. Acquisition of skill is at times acquired by appropriate objects in the environment, presented under appropriate conditions of arousal.

Lewis and Goldberg (1969) stress the importance of contingent reinforcement in creating a generalized expectancy in infancy that behavior has consequences. Given this expectancy, in an atmosphere where the infant is encouraged to venture, is rewarded for venturing and is shielded from interference in his mastery play, the infant will be motivated to produce and utilize behaviors not specifically reinforced in his past experiences. In Yarrow et al. (1971), two of the environmental variables found to be related to the infant's goal-directed behavior were the caretaker's contingent response to distress and the responsiveness of objects available to the infant. Bruner (1970, p. 6) underscores the relationship of infant activity and environmental stimulation: "From the point of view of trying to understand developmental patterns, what we really must ask about is the interaction between the environmental supply of stimulation and the organism's willingness to go out and explore it. This is the crucial factor."

This view is supported by research findings (Zigler and Butterfield, 1968; Blank and Soloman, 1968; and Pitts, 1968) that success in preschool programs depended upon motivation in task-oriented activities. Levenstein (1970), in her tutorial program for "disadvantaged" two year olds, found that gains in IQ were

correlated with the amount of pleasure children manifested in problem-solving tasks. Golden and Birns (1968) found that prediction from infant scales did not correlate with intellectual performance at age three. A motivational variable, "pleasure in task performance" during the administration of the Cattell Infant Scale at 18 months, was correlated with Stanford-Binet IQ at 3 years.

Though the importance of exploration of infant development is well established, criteria on what constitutes successful exploration is largely unknown. Wenar (1972), Kagan (1971), Mumbauer and Miller (1970), Saxe and Stollak (1971), Goldberg and Lewis (1969) and Messer and Lewis (1972) have utilized the observation of naturally occurring behaviors in a standardized setting.

Variables such as number of act changes, number of objects explored, length of time spent playing with any one toy, toy preferences, mobility, vocalization and quality of manipulative play have been proposed as possible meaningful dimensions of exploratory behavior. Children who display a high number of act changes are considered by Lewis (1967) to be of superior cognitive ability. Kagan (1971) considers rapid act changes to be indicative of hasty, impulsive information processing. For him, ideal exploratory behavior was evidenced by

long involvements with few toys punctuated by a series of frequent act changes.

Though data on exploratory behavior in infancy is scarce and criteria ill-defined, the theoretical importance of exploration of cognitive development strongly suggests the inclusion of such a measure in a comprehensive test battery. A Free Play Observation (FPO) coding number of objects explored, number of act changes, length of play intervals, vocalization and toy preferences was included in our testing series.

CHAPTER 3

RESEARCH STRATEGY AND SPECIFIC HYPOTHESES

The basic hypothesis tested in the study was that infant performance on various measures of cognitive-intellectual functioning would be a function of maternal caretaking practices at the age of 18 to 20 months, but not at 10 to 12 months. Consequently, testing was conducted at two points in time. One point was just prior to the infant's first birthday, while the second was prior to the second birthday. Maternal caretaking was assessed by one of three methods:

1. An attitude questionnaire (QNR)
2. An observation of parent-infant interaction in a controlled setting (WR)
3. An observation of parent-infant interaction in the natural environment (LRI)

Infant cognitive functioning was assessed by parts or all of four instruments:

1. The Development of Means, Vocal Imitation and Causality subscales of the IPDS
2. A series of object permanence tasks that violated infant cognitive expectancies (PUZZ)
3. A controlled observation of infant exploration behavior (FPO)

4. The Bilingual Receptive Language Inventory for Infants (BRLI)

Mothers were divided into categories of good and poor maternal caretakers on the basis of how they scored on the maternal measures. On each maternal measure, theoretical considerations and past research dictated that higher scores were associated with better maternal practices. For each measure, those mothers scoring in the top 50% were labeled good caretakers, and those scoring in the bottom 50% were labeled poor caretakers in providing environments conducive to cognitive growth in their infants.

Following the guide of White's (1972) hypothesis, it was predicted that older age infants of good caretaking mothers would perform better than older age infants of poor caretaking mothers. At the younger age, no differences in performance were expected as a function of maternal caretaking. Specifically, differences in favor of older age infants of good caretaking mothers were expected in the following ways:

1. Puzzlement Test: higher surprise behavior to discrepancy, more rapid habituation rates, and longer looking times to discrepancy.

2. Free Play Observation: more act changes, exploration of more toys during the observation period, more vocalization, and longer periods of sustained contact with toys.

3. Infant Psychological Development Scale: higher performance on the Development of Means, Vocal Imitation, and Causality subscales; more rated pleasure in the task performance and involvement in materials.

4. Bilingual Receptive Language Inventory: higher score on parents' report of vocabulary, higher score on performed items, a higher score on the parent report of language comprehension, and a higher score on the combined total.

CHAPTER 4

METHOD

Subjects

The research was conducted with the cooperation of the El Rio-Santa Cruz Neighborhood Health Center, which serves the Model Cities area of Tucson, Arizona. From the records of the registered patients served by the Center, a list was compiled of mothers with infants born between October 1, 1970 and February 28, 1971. Mothers were contacted in their homes, given written and verbal descriptions of what would be involved, and asked to participate. A small gift was offered as a mild incentive. Approximately 80% or 68 of the mothers contacted agreed to participate in the research.

An analysis of descriptive characteristics of the Ss appears in Table 1. The mothers were predominantly Mexican-American, with some Blacks and American Indians, and tended to be young, married and within the lower socioeconomic strata.

Design

The mothers and their infants were evaluated on two separate occasions, first during October and November

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF MOTHERS

Characteristic	Category	N	%	Characteristic	Category	N	%
Marital Status	Single	16	23	Index of Soc Pos*	Category #4	14	21
	Married	48	71		Category #5	54	79
	Divorced/Separated	4	6				
				Annual Income	$ 0-1000	15	22
Age	Less than 18	5	7		$1000-3001	21	31
	18-22	25	37		$3000-6000	28	41
	23-27	27	40		$6001 and above	4	6
	27-31	8	12				
	More than 31	3	4	Welfare Status	On Welfare	11	16
					Not on Welfare	57	84
Ethnic Group	Black	6	9				
	Mexican-American	54	79	Education of Mother (in years)	Less than 8	9	13
	Indian	1	10		8-9	11	16
	Anglo	1	2		10-11	16	24
					12	28	41
Employment of Mother	In School	5	7		Some College	4	6
	Housewife	52	77				
	Working	4	6	Predom. Language	English	62	91
	Unemployed	7	10		Spanish	6	9
Employment of Head of Household	In School	5	7	Total Family Members	2	18	26
	Working	26	38		3	26	38
	Unemployed	18	27		4	9	13
	No Male Head	19	28		5	5	7
					6	4	6
					7	5	7
					9	1	2

*(Hollingshead-Redlich, 1957)

of 1972 and later during June and July of 1973. During the two administrations, the same battery of assessment devices described above was given, with the exception that the Bilingual Receptive Language Inventory was given only during the second administration. The age of the infants during the first administration ranged from 9 to 12 months and from 18 to 22 months during the second administration.

Five of the assessment instruments necessitated a laboratory setting; therefore, the mothers and infants were transported to the University of Arizona Medical Center where observation rooms and video-tape equipment was available. The order of administration of these five instruments was: Puzzlement Test, Free Play Observation, Waiting Room Observation, Attitude Questionnaire, and Infant Psychological Development Scale. During the mother's visit to the Medical Center, an appointment was made with the mother to administer the Inventory of Home Stimulation in her home. For the second testing period only, arrangements were also made for administration of the Bilingual Receptive Language Inventory in the home.

Instruments

The assessment devices employed play a central role in the present research. A detailed description

of the administration and scoring of each instrument would be beneficial. In view of the great number of measures utilized in this study, a list of abbreviations and the measures they represent appears in Table 2 and in Appendix A.

Parent Attitude Measure (QNR)

Each mother was asked to complete a 24-item paper and pencil questionnaire consisting of items designed to measure her attitudes in three areas: the use of reward and punishment, the use of verbal stimulation and freedom from restriction, and the amount of influence she feels she has on her infant's cognitive growth and on the ability to control her environment. The mother was required simply to mark agreement or disagreement with each of the items. The correct responses were pre-agreed upon by the investigators on the basis of theoretical considerations. The test was available in English and Spanish and is reproduced in Appendix B. For scoring purposes, the number of correct responses was totaled. Those mothers scoring in the bottom 50% of the distribution of scores were assigned a 1 and considered poor caretakers; those scoring in the top 50% were assigned a 2 and considered good caretakers.

TABLE 2. ABBREVIATIONS OF VARIABLES

Name of Variable*	Abbreviation Code
Dependent (Infant) Measures	
Infant Psychological Development Scale	IPDS
Development of Means	DM
Vocal Imitation	VI
Causality	C
Pleasure in Task Performance	PTP
Involvement in Materials	IM
Free Play Observation	FPO
Number of Act Changes	ACT
Number of Toys in Contact	NTOYC
Average Length of Three Longest Contact Intervals	LCT
Amount of Vocalization During Free Play	VOC
Puzzlement Measure	PUZZ
Amount of Surprise	SURP
Percentage Change in Looking Time From First Trial to Pretrick Trial	PHAB
Percentage of Change in Looking Time From Pretrick Trial to Trick Trial	PRESP
Bilingual Receptive Language Inventory	BRLI
Performed Vocabulary Score	PV
Performed Task Score	PT
Total Performance Score	PVT
Parent Report Score	R
Total Performance Score Plus Parent Report Score (Bilingual Total)	BLT
Percentage Spanish	PCSPN
Percentage English	PCENG
Bilingual Quotient	BQ
Performed Bilingual Quotient	PBQ
Performed English Quotient	PEQ
Performed Spanish Quotient	PSQ
Reported Bilingual Quotient	RBQ
Reported English Quotient	REQ
Reported Spanish Quotient	RSQ
Independent (Maternal) Variables	
Attitude Questionnaire	QNR
Waiting Room Observation	WR
Inventory of Home Stimulation	LRI

*Any A preceding an abbreviation signifies a pretest variable. Any B preceding an abbreviation signifies a post test variable.

Mother-Infant Behavioral Observation Measure (WR)

Behaviors exhibited by the mothers toward their infants were recorded in an observational situation similar to that proposed by Saxe and Stollak (1971). Each mother and her infant were brought to a playroom in the laboratory trailer containing chairs and standard toys such as graduated rings, a beach ball, books, a form board, a truck, etc. Magazines for the mother were provided. The mother was given the following instructions: "Please wait in this room with your baby until we get our equipment set up for the next test. We'll come get you as soon as we are ready." The setting and instructions were similar to those used by Lewis and Goldberg (1969).

The mother's interaction with her child was observed for twenty minutes through a one-way mirror by a trained student observer. During each 10-second interval, a rating of the mother was made on eight behavioral variables, partially derived from a more comprehensive system developed by Moustakas, Sigel, and Schalock (1956). During each 10-second interval, more than one category could be scored, but no one category could be scored more than once during the interval. The behavioral categories and their operational definitions follow:

1. Non-attention (N): five consecutive seconds of not looking at the infant at all;

2. Attentive observation (C): five consecutive seconds of passively observing the infant without otherwise interacting;

3. Play (P): jointly participating in an activity or with an object;

4. Labeling (L): offering information verbally;

5. Positive reinforcement (RP): verbal praise contingent upon an activity of the infant;

6. Restricting behavior (RN): removing the toy from the child, removing the child from the object, hitting the child, verbal reprimand;

7. Stimulus introduction (S): introducing a new object in the room to the child;

8. Physical contact (H): physical contact not a part of playing such as holding, cuddling, or caretaking activities, i.e., diaper-changing or bottle-feeding.

For scoring purposes, only the play, labeling, and positive reinforcement categories were summed in an attempt to obtain a measure of positive maternal-infant interaction. The other categories measured maternal activities which were either negative or innoculous. A combined score of all categories was abandoned as too complicated. Again, mothers who scored in the bottom 50% of the score distribution were assigned a 1 and labeled poor caretakers; those in the top 50% were assigned a 2 and labeled good caretakers.

Six undergraduate students were trained to rate these behaviors in group sessions where they had the opportunity to observe and practice recording mothers and their infants interacting and to receive feedback on their perceptions. The inter-rater agreement for all categories ranged from 85% to 100%, which was considered adequate for observation in the experimental setting.

Inventory of Home Stimulation (LRI)

This inventory was designed to sample certain aspects of the quantity and quality of social, emotional and cognitive support available to a young child within his home. Items were included to tap such things as the importance of the opportunity to form a basic attachment to a mother or mother substitutes; an emotional climate characterized by mutual pleasure, sensitive need-gratification, and minimization of restriction and punishment; a physical environment that is both stimulating and responsive, offering a variety of modulated sensory experience; freedom to explore and master the environment; a daily schedule that is orderly and predictable; and an opportunity to assimilate and interpret experience within a consistent cultural milieu. The inventory combines interviewing and observation; one-third of the items require information gained through interviewing.

The instructions of the manual (Caldwell, Heider, and Kaplan, 1966) were followed by the students trained to administer the instrument. The students went into the homes at pre-arranged times when the child was awake and could be observed in his normal routine for that time of day. The entire procedure generally took about an hour. No assumptions were made that the presence of another person in the home did not in some way distort the parent-child interaction, or that the degree of distortion would be constant from one home to the next. However, it was assumed that as the time that the parent and the interviewer were together increased, it became progressively more difficult for the mother to inhibit her ordinary reaction tendencies.

Students used to administer the inventory were able to practice the technique in groups, pairs, and individually, following discussion and attainment of concensus regarding scoring. Inter-observer reliability coefficients were taken in standard situations and ranged from 87.5 to 99%.

The items were scored either yes or no and were unidirectional in nature. The total number of yes responses for each mother was tabulated. Mothers scoring in the bottom 50% of the score distribution were assigned a 1 and labeled poor caretakers; those in the top 50% were assigned a 2 and labeled good caretakers. A copy of the inventory appears in Appendix C.

Puzzlement Measure (PUZZ)

Various object permanence tasks were administered to all Ss in the TV studio at the University of Arizona Medical School. An apparatus was used in which a motor-operated pulley system transported objects behind a screen 15" wide to emerge in a viewing area to the infant's left. The object was in movement 4.5 seconds. The object was obscured from view for 3 seconds. After the object came to rest at the infant's left, the infant was allowed to view it for 15 seconds prior to its removal. The experimenter recorded the completion of the trial on the procedure sheet and observed a stopwatch in order to terminate a trial at the standard 15 second interval. This procedure was repeated until the infant successfully anticipated the emergence of the object on his left three times in succession. A trick trial was then initiated with the experimenter switching objects while the object was enroute behind the center screen. Transformational tasks included a change of shape, size, color, speed and direction. Three additional tasks were used to violate the infant's expectancy. In each instance, the trick trial was preceded by three pretrick trials. The trick trials on these tasks consisted of the following: handing the infant a doll with an animal face, clear water changing

color, and the experimenter donning glasses and a false nose in a peek-a-boo game. All tasks were presented in random sequence with the exception of the disguise task which was presented last in every case. Also on tasks involving shape, size and color, the objects were counter-balanced so that half of the infants observed the transformation in one direction, while the other half observed the opposite. The experimental procedure was video-taped with two cameras. One camera showed the stimulus display while the other camera had a view of the infant's face.

Prior to initiating the procedure, the infant was seated in front of the apparatus and was allowed to adapt to the test environment. He was given a toy with which to play. The mother was seated to the right and rear of the infant. The experimenter engaged the mother in conversation about the experimental procedure and stated that he was trying to learn about infant surprise reactions. She was counselled not to anticipate the trick trial herself nor to prepare the baby for it. If the baby fussed extensively during the procedure, the test was stopped to allow the mother to calm the baby.

Two experimenters were trained on a number of trial infants prior to the beginning of testing. Uniformity of procedure was stressed. Training goals

included precision in timing of object removal, observation of anticipation by the infant, elimination of extraneous stimuli and attraction of infant attention to E or the object during testing, and establishment of rapport with the infant. The experimenters were unaware to which group infants and mothers had been classified.

Undergraduates in psychology were trained to rate the videotapes. They observed previously recorded instances of infant surprise reactions and discussed various definitions of behaviors to be observed and recorded. Students rated videotapes previously rated by trained raters to establish mean interscore agreement. Behaviors were recorded on an Esterline-Angus Event Recorder. Thirteen channels were used with each student responsible for approximately four channels. Behaviors such as freezing, eyebrow and mouth movement, frowning and sobering, bafflement, fixation, smiling, vocalization, glances, search behavior, etc. were recorded. Three recorders were required to rate a tape.

After a task was completed, the trick trial was viewed again. The three raters made individual judgments on the level of surprise manifested by the infants. These judgments were made on the basis of pre-established definitions. After the individual judgments were made and a short description noted of the salient reaction,

the three raters discussed the infant's expressive behavior and formed a group decision about the level of surprise. If there was disagreement, then the trick trial was replayed and definitions discussed until consensus was reached. Different sets of raters rated 20% of the videotapes in common as a reliability check on the level of agreement in rating surprise behavior.

Pearson-product moment correlations were computed for reliability of observation of fixation to the object and percentage agreement on the level of surprise. Correlations for visual attention were in the 90's while surprise judgments were reliably measured in the high 80's. During the experiment, 18 infants were rated by two different sets of raters and the high reliabilities were maintained. All raters were unaware of groups to which the infants were assigned and the results of the other infant tests.

Amount of surprise (SURP) was judged on a three-point rating system: 3 = high; 2 = mild; 1 = low. The amount of surprise was summed across tasks and divided by the number of tasks. Habituation rate was determined by the amount of fixation on the first trial minus the amount of fixation on the pretrick trial, the total divided by the amount of fixation on the first trial. This yields a percent of habituation (PHAB) from trial

one to the pretrick trial. Similarly, the infant's response to the discrepant presentation was computed by subtracting the amount of fixation on the pretrick trial from the amount of fixation on the trick trial, dividing the remainder by the amount of fixation on the pretrick trial. This yields a percentage of response recovery on the trick trial (PRESP). Amount of fixation in all instances was determined by calculating the mean looking time per glance during a trial.

Infant Psychological Development Scale (IPDS)

Three subscales of the IPDS were administered: Development of Means for Achieving Desired Environmental Ends, Causality, and Vocal Imitation.

Administration of the IPDS was carried out in a room arranged for that purpose. Infants and their mothers were led into the testing room. The infants were placed in a high chair next to a table with the examiner at right angle to the child. The mother sat alongside the infant. Care was taken not to begin testing until the infant was at ease in the situation. The mothers or caretakers were informed that the examiner wanted to learn the sorts of things babies could do. Moreover, they were informed that in order to learn as much as possible, the subject would be presented with some tasks which would be too difficult for him. The standard procedures

for administering the IPDS were used for each subject (Uzgiris and Hunt, 1966).

A group of six examiners, two graduate students and four undergraduate students, was trained in both group and individual sessions. They observed a variety of infants in the 9-13 and 19-22 month age ranges being tested. They also viewed video-tapes of IPDS testing on these scales. Trainees were then allowed to test and score at least three infants while being observed by a trained examiner. One trainee at a time then tested a different infant in order to establish reliability between the principal examiner and the trainee on the scoring of the three subscales. Mean inter-score agreement was computed for each of the trainees with percentage agreement ranging from the high 90's to the low 80's. Scoring followed the method used by Wachs, et al. (1971) in awarding points to emphasize ease of passing as well as successful and unsuccessful performance.

The examiner marked the score sheet at periodic intervals during the examination. Scores were assigned on the Development of Means as follows:

5 = Immediate and perfect performance on every trial of the task.

4 = Success on the task but only after one or more failure attempts.

3 = Partial success on the task.

2 = Failure on the task.

The examiners presented 12 tasks in the Development of Means subscale. Their scores were collapsed into various binary pass-fail combinations to permit Guttman scaling techniques to be applied for tests of ordinality of the scale items. It was found that collapsing categories 5, 4, and 3 into one category of "pass" and maintaining category 2 as "fail" produced the highest coefficient of reproducibility in the scaling procedure. The data in Appendix D reflects this reduction of the scoring system on the Development of Means (DM). Vocal Imitation (VI) consisted of 7 items and was scored on a pass-fail basis. Causality (C) consisted of 9 items and was scored on a pass-fail basis. Because the text constructors described the causality scale as lacking ordinality, in that lower order behaviors would drop out of child's behavioral repertoire as higher order behaviors developed, the infant was credited with having passed all items below the highest item passed.

After the examiners completed the testing, they rated the child on two motivational variables, "pleasure in task performance" (PTP) and "involvement in materials" (IM). The ratings were on a three-point scale, with 3 = high; 2 = medium; and 1 = low. Though definitions

of the ratings were discussed, no attempts were made to establish inter-rater reliability on these judgments. The examiners were unaware of any rankings of risk assigned to the infant's mother.

Bilingual Receptive Language Inventory (BRLI)

A bilingual preschool teachers was selected to serve as the language examiner. She received 5 hours training in test administration from an infant language testing specialist. Initial visits were made to project participants by both test administrators. Scoring was done independently with inter-observer reliability showing average percent of agreement at 95%. The language examiner completed the testing on project participants with no further reliability checks.

Scoring and test administration procedures were in accordance with the instruction manual (Mazeika, 1972) The language examiner conducted the test session in the home of the child. She began by briefly explaining the test to the parent(s) and requesting their assistance. The importance of not mixing up the two languages was stressed, although several parents had a difficult time keeping them separate.

The language examiner then began testing the child. If the child was very shy or hesitant, the language examiner gave the child a toy to play with and

scored the "parent report only" so the child would feel less strange. This technique was also used if a child became tired or distracted during the test; the language examiner gave the child a "rest" and scored the parent report during this time.

In each of the sections, the child was asked the questions first in the weaker language, then in the dominant language. The weak and dominant categories were determined by the parents' appraisal; when there was a doubt, the language examiner chose the stronger language for the parent as the child's dominant language. Where no difference was observed, the language examiner alternated languages.

In each section, a series of questions were asked in one language before repeating them in the second language. In "household items" section, all four questions were asked in the first language, then repeated in the second language. The same held true in "unfamiliar items" section. In the performed test, the questions were grouped as follows: questions 1 through 7; questions 10 through 13 and 15; questions 14 and 16 through 21.

When the child missed at least three in a row in both languages on the performed task section, the test was concluded. Exceptions were made when children indicated understanding but did not perform.

The pattern described above was followed with all children. However, the nature of the age group and the home setting called for flexibility in the sequence in which the questions were asked. For instance, many children warmed up to the language examiner and the test and began to perform midway through the test. In these cases, the child would be asked some of the questions he/she refused to respond to earlier. The sequence was also broken by parents who were anxious to have their children perform well, and would ask their child earlier, easier questions that had not been responded to.

The parent report on the performed task section was completed at the end of the test session. Most of the sessions lasted 40 minutes, although they ranged in length from 30 minutes to over an hour. The longer sessions usually occurred because of many distractions and/or interruptions from the home situation.

In accordance with the test instructions, scoring consisted of a performed vocabulary score (PV), a performed task score (PT), and a parent's report (R) score. The vocabulary and task scores were combined to yield a total performance (PVT) score. The vocabularly, task and parent report scores were combined to yield a total score for the Bilingual Receptive Language Inventory (BLT). In addition, several bilingualism scores were computed using the following formulas:

Percentage Spanish (PCSPN) = $\frac{\text{Performed and Reported Spanish Items}}{\text{Performed and Reported Items}}$

Percentage English (PCENG) = $\frac{\text{Performed and Reported English Items}}{\text{Performed and Reported Items}}$

Bilingual Quotient (BQ) = $\frac{\text{Performed and Reported Bilingual Items}}{\text{Performed and Reported Items}}$

Performed Bilingual Quotient (PBQ) = $\frac{\text{Performed Bilingual Items}}{\text{Performed Items}}$

Performed English Quotient (PEQ) = $\frac{\text{Performed Bilingual Items}}{\text{Performed English Items}}$

Performed Spanish Quotient (PSQ) = $\frac{\text{Performed Bilingual Items}}{\text{Performed Spanish Items}}$

Reported Bilingual Quotient (RBQ) = $\frac{\text{Reported Bilingual Items}}{\text{Reported Items}}$

Reported English Quotient (REQ) = $\frac{\text{Reported Bilingual Items}}{\text{Reported English Items}}$

Reported Spanish Quotient (RSQ) = $\frac{\text{Reported Bilingual Items}}{\text{Reported Spanish Items}}$

Free Play Observation Procedure (FP)

Infants and their mothers were brought to a large room with an observational window at the University of Arizona Medical School. The mother was seated next to a wall opposite the observational window. Instructions were given to her not to interact with the infant during the session and to reorient the child to the toys if he approached her. The rater then placed 10 different toys

in a 3 foot by 5 foot rectangle at uniform distances from one another. The toys were placed in a preconceived order which remained standard for all infants. The infant's play was recorded over a 15 minute period. Behaviors were scored at 10 second intervals counted off by an electric timer. Each toy was coded so that data would be available on toy selection, number of act changes, and duration of contact.

An act change (ACT) is defined as initiating or terminating contact with a toy during a 10 second interval. Number of toys in contact (NTOYC) was calculated by summing the number of toys touched during the test session. The length or duration of continuous contact with toys (LCT) was determined by averaging the three longest time intervals in which the infant maintained contact with one toy. The absence of contact with a toy during one 10 second interval constituted the defined interruption of contact. The amount of vocalization (VOC) during free play was determined by summing the number of 10 second intervals in which there was vocalizing. Crying behavior was not considered in computing the vocalization score.

A group of 8 raters was given a list of categories with the behavioral definitions to be coded during the free play observation. The raters were trained in both group and individual sessions. They viewed a training videotape and observed a variety of infants playing

with the experimental toys in simulated test conditions. After 6 to 8 hours of training prior to the study, product-moment correlations of the 15 minute segments of play were completed between the trainer's ratings and each rater's observations. One rater at a time observed an infant with the trainer in order to correlate the relationship between the standard and the rater on the behavior categories. Peason product-moment correlations were computed with reliabilities in the 90's for all categories, demonstrating that the behaviors could be reliably measured. Periodic spot checks with two trained observers scoring independently yielded reliabilities in the 90's during the testing phase. The raters were unaware of the risk designations of the mothers and other measures of infant performance for each S.

CHAPTER 5

RESULTS

Mothers were rated either 1 (poor) or 2 (good) on maternal caretaking practices for each of the three independent measures (QNR, WR, LRI). Individual t tests were used to determine the effect of measured maternal caretaking upon the 26 dependent measures of infant cognition. The total summary of results are included in Appendix D.

Pretest

At pretest, there were no significant differences on any of the measures of cognitive ability as a function of measured maternal caretaking. Infants of mothers rated poor by the LRI at pretest tended (.07 level of confidence) to have higher LCT scores than infants of mothers rated good. This trend held up at post test, although much weaker.

Post Test

Questionnaire (QNR)

PUZZ. Infants of mothers rated good by the QNR measure showed significantly greater ($p<.05$; $df=1/56$;

t=2.23) surprise (SURP) on the puzzlement test than infants of mothers rated poor. On the other measures of the PUZZ test, there were no significant differences.

BRLI. Infants of mothers rated good by the QNR measure tended to have higher PT and PVT scores and lower REQ and PCSPN scores while having significantly higher PCENG ($p<.025$; df=55/1; $t=3.03$) and RSQ ($p<.05$; df=55/1; $t=2.27$) scores and significantly lower BR scores ($p<.025$; df=55/1; $t=2.32$). The other BRLI scores for the Questionnaire were non-significant.

IPDS. There were no significant differences on the IPDS measures of causality, vocal imitation, and development of means between infants of mothers rated by the QNR measure. There were also no significant differences on the motivational measures of the IPDS -- pleasure in task performance and involvement in materials.

FP. Infants of mothers rated good by the QNR measure tended to show fewer act changes and to vocalize more. There were no significant differences with or for NTOYC and LCT.

Waiting Room (WR)

PUZZ. Infants of mothers rated good by the WR measure tended to show greater SURP than infants of mothers rated poor. No significant differences occurred

on Puzzlement measures of PHAB and PRESP between infants of mothers rated by the WR measure.

BRLI. There were no significant differences on BRLI measures between infants of mothers rated by the WR measure. But, infants of mothers rated good by WR tended to have greater PV scores and lesser PCENG, RBQ, RSQ, and BQ scores than did infants of mothers rated poor by WR.

IPDS. As with the QNR measure, there were no significant differences on the cognitive measures of the IPDS between infants of mothers rated by WR. However, infants of mothers rated good by WR tended to show less pleasure in task performance and revealed significantly less ($p<.01$; $df=54$; $t=2.99$) involvement in materials.

FP. There were no significant differences on FP measures between infants of mothers rated by the WR measure.

Living Room Interaction (LRI)

PUZZ. There were no significant differences on PUZZ measures between infants of mothers rated by the LRI measure.

BRLI. Infants of mothers rated good by LRI had significantly lower ($p<.025$; $df=37$; $t=2.38$) PCSPN and PEQ scores as well as significantly lower ($p<.05$; $df=37$; $t=2.25$) REQ scores. These infants also tended to have

lower PBQ and PSQ scores than infants of mothers rated poor by the LRI measure.

IPDS. Again, there were no significant differences for the cognitive measures of the IPDS. Infants of mothers rated good by the LRI measure, however, tended to show greater pleasure in task performance and demonstrated significantly greater ($p<.05$; $df=36$; $t=2.27$) involvement in materials.

FP. Infants of mothers rated good by LRI came into contact with a significantly greater ($p<.05$; $df=37$; $t=2.17$) number of toys and vocalized less ($p<.01$; $df=37$; $t=2.62$) than infants of mothers rated poor by LRI.

Table 3 summarizes results reported for the Puzzlement, Infant Psychological Development Scale, and Free Play measures. Table 4 summarizes results reported for the Bilingual measure.

TABLE 3. SUMMARY OF RESULTS IN TERMS OF LEVEL OF p ATTAINED AT POST TEST FOR PUZZ, IPDS, AND FP MEASURES BY THREE MEASURES OF MATERNAL CARETAKING (QNR, WR, LRI)

		Infant Measurements							
		PUZZ				IPDS			
		SURP	PHAB	PRESP	C	DM	VI	PTP	IM
Maternal Measure-ments:	QNR	.05	ns	ns	ns	ns	ns	ns	ns
	WR	t*	ns	ns	ns	ns	ns	t	.01
	LRI	ns**	ns	ns	ns	ns	ns	t	.05

		Infant Measurements			
				FP	
		ACT	NTOYC	LCT	VOC
Maternal Measure-ments:	QNR	t	ns	ns	t
	WR	ns	ns	ns	ns
	LRI	ns	.05	t	.01

*t = trend ($.06 < p < .10$)
**ns = non-significant

TABLE 4. SUMMARY OF RESULTS IN TERMS OF LEVEL OF p ATTAINED AT POST TEST FOR BRLI MEASURE BY THREE MEASURES OF MATERNAL CARETAKING (QNR, WR, LRI)

BRLI Infant Measurements

		PV	PT	R	PVT	BLT	PCENG	PCSPN
Maternal Measure-ments:	QNR	ns**	t*	.025	t	ns	.01	.05
	WR	t	ns	ns	ns	ns	t	ns
	LRI	ns	ns	ns	ns	ns	ns	.025

BRLI Infant Measurements

		PBQ	PEQ	PSQ	RBQ	REQ	RSQ	BQ
Maternal Measure-ments:	QNR	ns	ns	ns	ns	t	.05	ns
	WR	ns	ns	ns	t	ns	t	t
	LRI	.05	.01	.05	ns	.05	ns	ns

*t = trend ($.06 < p < .10$)
**ns = non-significant

CHAPTER 6

DISCUSSION

The results, to some extent, are difficult to interpret. There were no significant differences in measured infant cognitive ability as a function of measured maternal caretaking at the pretest period, and there were several significant differences at the post test period. This overall finding, in general, tends to support White's (1972) hypothesis that maternal caretaking does not appreciably affect infant cognitive functioning until some time after the first year of life, following the acquisition of locomotive and other activities which allow interaction with the environment.

However, the direction of the differences on the cognitive measures varied depending on the measure of maternal caretaking. According to one maternal classification system, infants of mothers rated good would have higher scores on certain measures of cognitive ability than infants of mothers rated poor, while on another maternal classification system, the opposite relation would hold. Also, one classification system would reveal differences on a cognitive measure, while the other

classification system would not. For example, on the Free Play measure, infants of mothers rated good by QNR showed greater vocalization than infants of mothers rated poor, whereas the opposite relationship held for infants of mothers rated by the LRI.

Infants of mothers rated good by the QNR tended to have fewer act changes and vocalize more in a standard observational situation, show significantly greater surprise to violation of expectancies, and to demonstrate greater significantly English and Bilingual scores. although the parents reported less bilingual ability than infants of mothers rated poor by the QNR.

The picture that emerges of infants of mothers rated good by the WR measure reveals less pleasure and involvement during a standardized one-to-one testing situation, more surprise to violation of expectancy, and less English and bilingual ability.

Mothers rated good by the LRI tended to have infants who play with a greater number of toys and vocalize less in a standard observational setting, demonstrate greater pleasure and involvement in a standard one-to-one testing situation, speak less Spanish, are less bilingual, and have parents who report less bilingual skills than do infants of mothers rated poor by the LRI.

The QNR measure of maternal caretaking did the most to confirm the original hypotheses, as all of the significant and trend differences on cognitive measures were in the predicted direction. With regard to the motivational infant measures (PTP and IM) and NTOYC, the LRI measure of maternal caretaking also confirmed the predicted direction. But differences between the VOC scores of infants rated by the LRI were in the opposite of the predicted direction. The WR classification of maternal caretaking tended to confirm the prediction of more surprise to violation of expectancy for infants of good caretaking mothers, but produced results opposite to the prediction of greater pleasure in task performance and involvement for infants of good caretaking mothers.

One possible explanation for the discrepancies between the classification systems, especially QNR and WR, is that WR was loading in some manner for cultural considerations not taken into account by QNR. Evidence for this possible explanation comes from two sources. The first source is the BRLI, where mothers rated "2" or good by the WR system tended to have infants who were Spanish speaking only. The second source is the subjective impressions gained through observation of the WR test administration. Mothers who scored well on this measure were ones who jointly participated with their infants on

activities, offered verbalization, and praised their infants. Spanish-speaking-only mothers seemed to be less inhibited and performed a greater number of these activities. Also, there did not appear to be, in retrospect, enough attention given to the quality of interaction between mother and infant during the WR administration. A non-contingent verbalization, for example, was scored similarly to a contingent verbalization. This cultural factor requires much more study before any definitive statements can be made.

While some measures of maternal caretaking produced differences on some measures of infant cognitive ability, the overall lack of consistent significant findings makes any conclusions tenuous at best. The lack of significant differences may be a result of some deficiencies in the infant measures. This may well be the case with the three subscales of the IPDS, where ceiling effects may have taken place. King and Seegmiller (1972) found a ceiling effect which erased differences between black infants past 20 months of age. The mean age of the infants of this study at post test was 18 months.

Another explanation for the overall lack of significant differences at the older age is that there were deficiencies in the maternal caretaking measures. Perhaps it is unfeasible to expect to accurately measure

caretaking style through a brief, isolated sample of maternal behavior and as both the LRI and WR measures attempted to do. White (1972), in his study of maternal caretaking practices and their effect upon cognition, classified the mothers with regard to caretaking only after one year of weekly behavior samples. It is interesting that the QNR, which attempts to classify mothers' caretaking styles on the basis of supposedly well-entrenched attitudes, produced the findings most consistent with regard to past research. In work with attitude sampling, it is generally assumed that attitudes are indicators of consistent behavior patterns.

A third explanation for the overall lack of significant differences between infants of mothers classified as good and poor caretakers is that there are no differences; that the null hypothesis is true. However, the fact that there were several significant findings at the older age and none at the younger age, and the results of similar kinds of research where differences were found, considerably weakens no differences as an explanation. The proposal of deficiencies in the maternal caretaking measures appears to be the strongest in explaining the overall lack of significant differences in this research. The area of assessment of maternal caretaking has not received nearly as much attention as

assessment of cognitive functioning in infancy. White's method of a year-long observation period is not practical for assessing caretaking style. Perhaps observing mothers as they perform certain prescribed teaching and interaction tasks with their infants would produce greater clarity in assessing maternal caretaking style. Farmer (in preparation) apparently had good success in measuring maternal risk for producing cognitive deficits in infants by objectifying the subjective impressions of a nurse and a teacher visiting the mothers' homes for the purpose of giving a physical and administering a language examination. Perhaps an appropriate tact to take in assessing maternal caretaking would be to examine and define the parameters which guide the formation of subjective impressions in trained or reliable observers.

In summary, some evidence was obtained to support Burton White's (1972) hypothesis that the age range from ten to eighteen months is a critical period for the development of cognitive skills and is a time of particular sensitivity to maternal caretaking. This evidence is largely based on the relative number of significant findings at pre- and post test. However, the results in large part are insignificant and in some cases inconsistent. Cultural factors may have been providing extraneous, uncontrolled variables or measuring instruments may have

been defective, but in general, the research indicates that measurement of environmental impact upon infant cognition is possible and suggests that intervention programs designed to enhance cognitive development may begin as early as twelve months.

APPENDIX A

ABBREVIATIONS OF VARIABLES

Name of Variable*	Abbreviation Code
Dependent (Infant) Measures	
Infant Psychological Development Scale	IPDS
Development of Means	DM
Vocal Imitation	VI
Causality	C
Pleasure in Task Performance	PTP
Involvement in Materials	IM
Free Play Observation	FPO
Number of Act Changes	ACT
Number of Toys in Contact	NTOYC
Average Length of Three Longest Contact Intervals	LCT
Amount of Vocalization During Free Play	VOC
Puzzlement Measure	PUZZ
Amount of Surprise	SURP
Percentage Change in Looking Time From First Trial to Pretrick Trial	PHAB
Percentage of Change in Looking Time From Pretrick Trial to Trick Trial	PRESP
Bilingual Receptive Language Inventory	BRLI
Performed Vocabulary Score	PV
Performed Task Score	PT
Total Performance Score	PVT
Parent Report Score	R
Total Performance Score Plus Parent Report Score (Bilingual Total)	BLT
Percentage Spanish	PCSPN
Percentage English	PCENG
Bilingual Quotient	BQ
Performed Bilingual Quotient	PBQ
Performed English Quotient	PEQ
Performed Spanish Quotient	PSQ

*Any A preceding an abbreviation signifies a pretest variable.

Any B preceding an abbreviation signifies a post test variable.

Name of Variable	Abbreviation Code
Reported Bilingual Quotient	RBQ
Reported English Quotient	REQ
Reported Spanish Quotient	RSQ
Independent (Maternal) Variables	
Attitude Questionnaire	QNR
Waiting Room Observation	WR
Inventory of Home Stimulation	LRI

APPENDIX B

QUESTIONNAIRE (QNR) FORM

INFANT STIMULATION

NAME: _____ DATE: _____

Instructions

These questions are designed to help us know how you feel about different issues. Each item consists of two alternative answers, "a" or "b". Please select the one statement of each pair which you most strongly believe in and live by. Please choose the one you believe to be true, rather than the one you think we want you to mark.

_____ 1. a. When a child does something good, he should be told so right away.
b. A child should be expected to act good.

_____ 2. a. I control what is going to happen in the future.
b. I have little control over what will happen in the future.

_____ 3. a. Parents should teach children the correct way to play with toys.
b. A child should be allowed to play with a toy in any harmless way he chooses.

_____ 4. a. I believe my baby is too young to look at books.
b. I often look at books with my baby.

_____ 5. a. A playpen should seldom be used.
b. A playpen is important to use as it keeps baby out of trouble.

_____ 6. a. It is not too important for a mother to talk to her child before he has begun to talk.
b. It is important for a mother to talk to her child before he learns to talk.

_____ 7. a. People either like me or dislike me, no matter what I do.
b. I can make most people like me if I want to.

_____ 8. a. It is not important to talk to a baby using adult language.
b. It is important to talk to a baby using adult language.

_____ 9. a. A child is best rewarded with something he likes a lot.
b. A child is best rewarded with something his parents like a lot.

_____ 10. a. Some children can't learn no matter what their parents do.
b. Parents can teach any child to learn something.

_____ 11. a. It is good to pay attention to children who are playing well.
b. Children who are playing well should be left alone.

_____ 11. a. Play is fun for children though they don't learn much from it.
b. Play is fun for children and they learn a lot from it.

_____ 13. a. I prefer to let my baby play by himself while I work.
b. I often talk to my baby as I work.

_____ 14. a. A child should be allowed to play anywhere in the house as long as his health is not in danger.
b. A child should have own special area in which to play.

_____ 15. a. Bad luck has caused many of my unhappy moments.
b. Most of my unhappy moments are my own fault.

_____ 16. a. I imitate my baby's sounds.
b. I seldom imitate my baby's sounds.

_____ 17. a. How smart a child is depends on how good a brain he was born with.
b. How smart a child is mostly depends on how people help him to learn.

_____ 18. a. Babies can learn.
b. Children don't learn much before they are two years old.

_____ 19. a. I think a child who fusses should be spanked.
b. I think a child who fusses should be ignored.

_____ 20. a. Real learning starts when a child is born.
b. Real learning starts when a child goes to school.

_____ 21. a. I let my baby play with lots of things in the house.
b. A baby should play with his own toys.

_____ 22. a. Becoming a success is a matter of luck.
b. Becoming a success is a matter of hard work.

_____ 23. a. What my child learns is really up to me.
b. I have little control over what my child learns.

_____ 24. a. Children who act bad should be ignored.
b. Paying attention to a child who acts bad will help him to act better.

APPENDIX C

LIVING ROOM INTERACTION SCALE (LRI)

FAMILY DATA INVENTORY

Interviewer _____

Mother _____

Date _____

Child's Age (in months) _____ Child's Birthdate _____

Child's Name _____ Sex _____
Last First Middle

Address _____ City _____ Phone _____

Main Wage Earner: _____

Mother: Name _____ Age _____

Marital Status: Married___ Separated___ Divorced___
Widowed___ Other___

Father: Name _____ Age _____

Education Completed _____ Occupational Training _____

Employment _____

No Positions in Last Year ____

Other

Caregiver: Name _____ Age _____

Relation to Child: Natural Parent___ Foster___
Adoptive___ Relative___ Other___

Marital Status: Married___ Separated___ Divorced___
Widowed___ Other___

How long has child been with mother? _____

With Caregiver? _____

Language regularly spoken in the home _____

Health Status: Child's: Good/Poor

Mother's: Good/Poor

Caregiver's: Good/Poor

Comments: _____

_____

_____

Total number of children (under 16) living in household ___

Total number of adults (over 16) living in household _____

Dwelling: Room _____
Apartment _____
House _____
Owner _____
Renter _____

How long has family lived at present address? _____

Number Residences in last 5 years _____

I. EMOTIONAL AND VERBAL RESPONSIBILITY OF MOTHER	YES	NO
1. Mother spontaneously vocalizes to child at least twice during visit (excluding scolding).		
2. Mother responds to child's vocalizations with a verbal response.		
3. Mother tells child the name of some object during visit or says name of person or object in a "teaching" style.		
4. Mother's speech is distinct, clear, and audible.		
5. Mother initiates verbal interchanges with observer -- asks questions, makes spontaneous comments.		
6. Mother expresses ideas freely and easily and uses statements of appropriate length for conversation, e.g., gives more than brief answers.		
7. *Mother permits child occasionally to engage in "messy" types of play.		
8. Mother spontaneously praises child's qualities or behavior twice during visit.		
9. When speaking of or to child, mother's voice conveys positive feeling.		
10. Mother caresses or kisses child at least once during visit.		
11. Mother shows some positive emotional responses to praise of child offered by visitor.		
SUBSCORE		

*Item which may require direct questions)

II. AVOIDANCE OF RESTRICTION AND PUNISHMENT	YES	NO
12. Mother does not shout at child during visit.		
13. Mother does not express overt annoyance with or hostility toward child.		
14. Mother neither slaps nor spanks child during visit.		
15. *Mother reports that no more than one instance of physical punishment occurred during the past week.		
16. Mother does not scold or derogate child during visit.		
17. Mother does not interfere with child's actions or restrict child's movements more than three times during visit.		
18. At least ten books are present and visible.		
19. *Family has a pet.		
SUBSCORE		

III. ORGANIZATION OF PHYSICAL AND TEMPORAL ENVIRONMENT		
20. When mother is away, care is provided by one of three regular substitutes.		
21. Someone takes child into grocery store at least once a week.		
22. Child gets out of house at least four times a week.		
23. Child is taken regularly to doctor's office or clinic.		

	YES	NO
24. *Child has a special place in which to keep his toys and treasures.		
25. Child's play environment appears safe and free of hazards		
SUBSCORE		

IV. PROVISION OF APPROPRIATE PLAY MATERIALS		
26. Child has some muscle activity toys or equipment.		
27. Child has push or pull toy.		
28. Child has stroller or walker, kiddie car, scooter or tricycle.		
29. Mother provides toys or interesting activities for child during interview.		
30. Provides learning equipment appropriate to age -- cuddly toy or role-playing toys.		
31. Provides learning equipment appropriate to age -- mobile, table and chairs, high chair, play pen.		
32. Provides eye-hand coordination toys -- items to go in and out of receptable, fit together toys, beads.		
33. Provides eye-hand coordination toys that permit combinations -- stacking or nesting toys, blocks or building toys.		
34. Provides toys for literature and music.		
SUBSCORE		

V. MATERNAL INVOLVEMENT WITH CHILD	YES	NO
35. Mother tends to keep child within visual range and to look at him often.		
36. Mother "talks" to child while doing her work.		
37. Mother consciously encourages developmental advance.		
38. Mother invests "maturing" toys with value via her attention.		
39. Mother structures child's play periods.		
40. Mother provides toys that challenge child to develop new skills.		
SUBSCORE		

VI. OPPORTUNITIES FOR VARIETY IN DAILY STIMULATION		
41. Father provides some caretaking every day.		
42. Mother reads stories at least three times weekly.		
43. Child eats at least one meal per day with mother and father.		
44. Family visits or receives visits from relatives.		
45. Child has three or more books of his own.		
SUBSCORE		

APPENDIX D

SUMMARY OF T-TEST RESULTS COMPARING INFANTS' SCORES ON MEASURES OF THE PUZZ, BRLI, IPDS, AND FP TESTS IN RELATION TO MOTHERS' RATINGS ON THREE MEASURES OF MATERNAL CARETAKING

TABLE D-1. RESULTS OF PUZZLEMENT TEST (PUZZ)

Summary of t-test results comparing infants' scores on measures of the PUZZ test in relation to mothers' ratings on three measures of maternal caretaking.

MATERNAL MEASURES	RATING	INFANT MEASURES - PRETEST							
		ASURP				APHAB			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
AQNR	1	1.231	.266	28	.1904	.107	.373	27	1.9495
	2	1.243	.229	28		.272	.240	28	
AWR	1	1.272	.265	23	.6776	.142	.260	23	1.6326
	2	1.224	.231	26		.265	.263	25	
ALRI	1	1.198	.256	21	.5833	.240	.269	21	1.2947
	2	1.238	.211	25		.108	.392	24	

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BSURP				BPHAB			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	1.286	.286	27	2.2296	.006	.272	26	1.2420
	2	1.502	.428	31		.097	.275	31	
BWR	1	1.323	.290	27	1.7649	.065	.313	27	.4404
	2	1.500	.437	28		.031	.244	27	
BLRI	1	1.445	.370	18	.8314	.071	.300	17	.1271
	2	1.338	.405	19		.059	.302	19	

Note: 1 = low performance
2 = high performance

TABLE D-1 (Continued)

MATERNAL MEASURES	RATING	INFANT MEASURES - PRETEST			
		APRESP			
		$\bar{X}$	SD	n	t
AQNR	1	.635	.775	28	.9334
	2	.851	.947	28	
AWR	1	.686	.714	23	.7456
	2	.877	1.030	26	
ALRI	1	1.048	1.121	21	1.8245
	2	.564	.650	25	

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST			
		BPRESP			
		$\bar{X}$	SD	n	t
BQNR	1	.818	.510	27	.5796
	2	.740	.518	31	
BWR	1	.814	.491	27	.9295
	2	.691	.500	28	
BLRI	1	.829	.496	18	.9075
	2	.693	.411	19	

Note: 1 = low performance
2 = high performance

TABLE D-2. RESULTS OF BILINGUAL RECEPTIVE LANGUAGE INVENTORY (BRLI)

Summary of t-test results comparing infants' scores on measures of the IPDS test in relation to mothers' ratings on three measures of maternal caretaking.

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BPV				BPT			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	5.520	2.845	25	.7857	6.200	4.010	25	1.7833
	2	6.125	2.915	32		8.125	4.070	32	
BWR	1	5.286	2.275	28	1.6001	6.964	3.543	28	.7914
	2	6.519	3.355	27		7.852	4.713	27	
BLRI	1	6.000	2.449	19	.3203	6.684	4.177	19	.2400
	2	5.700	3.310	20		7.000	4.039	20	

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BR				BPVT			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	16.200	2.198	25	2.3182	11.720	5.280	25	1.6656
	2	14.844	2.187	32		14.250	5.989	32	
BWR	1	15.500	2.134	28	.7230	12.250	4.343	28	1.3597
	2	15.074	2.235	27		14.370	6.968	27	
BLRI	1	15.211	2.347	19	.6582	12.684	5.468	19	.0086
	2	15.700	2.296	20		12.700	6.027	20	

Note: 1 = low performance
2 = high performance

TABLE D-2 (Continued) RESULTS OF BRLI

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BBLT				BPCENG			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	27.920	5.115	25	.7794	54.800	36.699	25	3.0342
	2	29.094	6.018	32		79.719	25.235	32	
BWR	1	27.750	4.213	28	1.1009	76.607	29.104	28	1.6133
	2	29.444	6.925	27		62.815	34.181	27	
BLRI	1	27.895	5.705	19	.2706	61.368	31.382	19	.9863
	2	28.400	5.942	20		71.950	35.368	20	

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BPCSPN				BPBQ			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	86.000	26.456	25	2.0657	.235	.208	25	.0762
	2	70.281	30.000	32		.239	.204	32	
BWR	1	76.893	30.553	28	.0463	.271	.213	28	.9795
	2	76.519	29.364	27		.216	.197	27	
BLRI	1	90.158	9.400	19	2.3792	.315	.209	19	2.0448
	2	69.150	37.358	20		.185	.190	20	

Note: 1 = low performance
2 = high performance

TABLE D-2 (Continued) RESULTS OF BRLI

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BPEQ				BPSQ			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	.480	.378	25	.8622	.327	.311	25	1.0630
	2	.399	.325	32		.419	.339	32	
BWR	1	.476	.352	28	.9601	.411	.324	28	.4810
	2	.387	.329	27		.368	.336	27	
BLRI	1	.589	.324	19	2.6186	.475	.327	19	1.1371
	2	.320	.317	20		.351	.351	20	

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BRBQ				BREQ			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	.466	.362	25	1.1654	.883	.266	25	1.9048
	2	.567	.290	32		.738	.302	32	
BWR	1	.595	.327	28	1.5843	.803	.307	28	.1795
	2	.459	.306	27		.789	.293	27	
BLRI	1	.602	.307	19	1.2884	.928	.092	19	2.2536
	2	.463	.365	20		.726	.380	20	

Note: 1 = low performance
2 = high performance

TABLE D-2 (Continued) RESULTS OF BRLI

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BRSQ				BBQ			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	.549	.398	25	2.2676	.399	.311	25	1.1736
	2	.763	.315	32		.487	.255	32	
BWR	1	.766	.328	28	1.8660	.517	.294	28	1.7055
	2	.588	.378	27		.390	.255	27	
BLRI	1	.672	.342	19	.1933	.521	.269	19	1.3432
	2	.648	.413	20		.395	.314	20	

Note: 1 = low performance
2 = high performance

TABLE D-3. RESULTS OF INFANT PSYCHOLOGICAL DEVELOPMENT SCALE TEST (IPDS)

Summary of t-test results comparing infants' scores on measures of the IPDS test in relation to mothers' ratings on three measures of maternal caretaking.

MATERNAL MEASURES	RATING	INFANT MEASURES - PRETEST							
		AC				AVI			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
AQNR	1	4.559	1.709	34	.4322	3.147	1.258	34	.1114
	2	4.750	1.884	32		3.188	1.674	32	
AWR	1	4.567	1.870	30	.4351	3.233	1.478	30	.2115
	2	4.778	1.783	27		3.148	1.562	27	
ALRI	1	4.630	1.757	27	.2195	3.074	1.412	27	.6631
	2	4.731	1.589	26		3.346	1.573	26	

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BC				BVI			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	7.735	1.377	24	.2648	3.708	1.488	24	.3180
	2	7.467	1.167	30		3.833	1.392	30	
BWR	1	7.500	1.175	26	.1644	3.615	1.416	26	.7839
	2	7.444	1.281	27		3.926	1.466	27	
BLRI	1	7.278	1.406	18	.9291	3.722	1.320	18	.2095
	2	7.667	1.085	18		3.833	1.823	18	

Note: 1 = low performance
2 = high performance

TABLE D-3 (Continued)

MATERNAL MEASURES	RATING	INFANT MEASURES - PRETEST							
		ADM				APTP			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
AQNR	1	8.265	2.233	34	.3936	2.029	.717	34	1.4589
	2	8.063	1.917	32		2.281	.683	32	
AWR	1	8.300	2.395	30	.2013	2.133	.730	30	.4861
	2	8.185	1.841	27		2.222	.641	27	
ALRI	1	8.296	2.016	27	.2561	2.000	.734	27	1.3963
	2	8.154	2.034	26		2.269	.667	26	

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BDM				BPTP			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	9.583	1.139	24	.2577	2.231	.815	26	.0601
	2	9.667	1.213	30		2.219	.706	32	
BWR	1	9.808	1.059	26	.9062	2.393	.629	28	1.5993
	2	9.519	1.252	27		2.071	.858	28	
BLRI	1	9.944	1.211	18	1.1287	2.053	.848	19	1.7551
	2	9.500	1.150	18		2.474	.612	19	

Note: 1 = low performance
2 = high performance

TABLE D-3 (Continued)

MATERNAL MEASURES	RATING	INFANT MEASURES - PRETEST							
		AIM				AIPDS			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
AQNR	1	2.029	.717	34	1.4589	5.324	1.460	34	.0279
	2	2.281	.683	32		5.333	1.391	32	
AWR	1	2.267	.740	30	.6345	5.367	1.631	30	.0096
	2	2.148	.662	27		5.370	1.221	27	
ALRI	1	2.074	.730	27	1.0584	5.333	1.435	27	.2052
	2	2.269	.604	26		5.410	1.287	26	

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BIM				BIPDS			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	2.115	.816	26	.5169	6.889	1.048	24	.4019
	2	2.219	.706	32		6.989	.780	30	
BWR	1	2.464	.693	28	2.9883	6.974	.765	26	.0460
	2	1.893	.737	28		6.963	1.104	27	
BLRI	1	1.895	.809	19	2.2678	6.981	.987	18	.0582
	2	2.421	.607	19		7.000	.922	18	

Note: 1 = low performance
2 = high performance

TABLE D-4. RESULTS OF FREE PLAY OBSERVATION (FP)

Summary of t-test results comparing infants' scores on measures of the FP test in relation to mothers' ratings on three measures of maternal caretaking.

MATERNAL MEASURES	RATING	INFANT MEASURES - PRESTEST							
		AACT				ANTOYC			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
AQNR	1	30.200	13.661	35	.6523	6.571	2.240	35	.7747
	2	32.344	13.188	32		7.000	2.286	32	
AWR	1	31.367	13.200	30	.3468	6.565	2.359	30	.7049
	2	32.630	14.297	27		7.000	2.270	27	
ALRI	1	30.037	12.841	27	1.1425	6.481	2.260	27	1.7050
	2	34.077	12.899	26		7.462	1.902	26	

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BACT				BNTOYC			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	47.577	12.844	26	1.6421	7.615	1.472	26	.0476
	2	40.594	18.319	32		7.594	1.898	32	
BWR	1	44.931	16.347	29	.5589	7.724	1.461	29	.5354
	2	42.517	16.541	29		7.483	1.939	29	
BLRI	1	44.947	16.253	19	.5006	7.421	1.502	19	2.1758
	2	47.250	12.298	20		8.300	.979	20	

Note: 1 = low performance
2 = high performance

TABLE D-4 (Continued)

MATERNAL MEASURES	RATING	INFANT MEASURES - PRETEST							
		ALCT				AVOC			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
AQNR	1	15.029	7.466	35	.8416	14.457	13.798	35	.5134
		13.625	6.031	32		16.063	11.570	32	
		14.533	6.383	30	.8946	13.500	14.680	30	.7412
		12.963	6.870	27		16.037	10.574	27	
		15.037	6.519	27	1.9290	15.074	13.845	27	.3310
		11.846	5.453	26		16.269	12.370	26	

MATERNAL MEASURES	RATING	INFANT MEASURES - POST TEST							
		BLCT				BVOC			
		$\bar{X}$	SD	n	t	$\bar{X}$	SD	n	t
BQNR	1	14.231	4.676	26	.1833	12.808	11.211	26	1.6700
	2	14.500	6.185	32		19.125	16.415	32	
BWR	1	13.897	5.627	29	.6634	17.655	15.744	29	.7098
	2	14.862	5.456	29		14.931	13.390	29	
BLRI	1	15.211	5.593	19	1.5174	22.789	16.972	19	2.6239
	2	12.950	3.531	20		10.000	13.338	20	

Note: 1 = low performance
2 = high performance

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