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Mother-infant interaction in delayed infants of three diagnostic groups involved in early intervention.

Lisa Ann Smith
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MOTHER-INFANT INTERACTION IN DELAYED INFANTS OF THREE DIAGNOSTIC GROUPS INVOLVED IN EARLY INTERVENTION

by

Lisa Ann Smith

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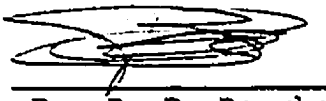

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ABSTRACT

MOTHER-INFANT INTERACTION IN DELAYED INFANTS

OF THREE DIAGNOSTIC GROUPS INVOLVED IN EARLY INTERVENTION

by

Lisa Ann Smith

The goal of the present study was to assess the effects of diagnostic group and time in early intervention, on mother-infant interaction with delayed infants. Seventy-eight mother-infant dyads, of various ethnic backgrounds, enroled in early intervention were subjects. Three diagnostic groups were represented: Down's Syndrome (n=24), Neurologically impaired (n=38), and Unknown etiology (n=16). Dyads were visited by a research coordinator before entering the early intervention program and one year after entry. Dyads were videotaped for a 9 minute interaction sequence. The sequences were scored by two independent raters on a rating scale consisting of 19 dependent measures representing specific aspects of interaction. Assessed were 13 parent behaviors (turn taking, control, positioning, facial expression, vocal appropriateness, vocal expression, pleasure with child, displeasure with child, use of developmentally appropriate materials, adaptive behavior, physical contact, choice of a special activity, and enjoyment of the activity a mother total score, and 5 child behaviors (facial expressiveness, smiling, eye contact, vocalization, activity level).

A number of dependent measures exhibited significant (<.01) positive change over time. Noted was the different pattern of change exhibited by each diagnostic group. The Down's Syndrome group exhibited positive change in more areas than the other two groups. The Neurological group demonstrated change in the fewest number of areas. Results were presented with mean scores to allow determination of whether or not the lack of positive change resulted from true lack of change, or from a ceiling effect resulting from the constraints of the scale used. Results were discussed in terms of implications for future research and clinical work: the importance of recognizing heterogeneity in the delayed population and the potential for improving service delivery to specific members of the delayed population.

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There are many people who I must thank for their generous contributions to this project. People who not only gave of their expertise but also of their time. As a graduate student I understand how precious time can be.

The first person I must thank is Elizabeth Thompson. If she had not hired me years ago as an undergraduate research assistant, my role in this large research project would not have come to fruition. Her guidance, understanding, and most of all her example, have been very treasured gifts indeed.

Because this project is a small part of a larger study ongoing at the Hospital for Sick Children in Toronto, there are a number of people there who have contributed greatly. First of all is Dr. Sharon Marcovitch; her supervision on this project was very much appreciated. She was always available to me for guidance and advice. Both Elaine McKinnon and Christine Kenwood gave generously of their time and computer expertise. Their help was invaluable. Other people on the project are too numerous to mention but their efforts are appreciated greatly. Also associated with the group at Sick Kids are the families who participated in this study. I have learned a great deal from them and I wish them well.

A number of individuals here at the University of Windsor have also contributed significantly to this project.

The helpful and insightful comments of my committee members, Dr. Hakim-Larson and Dr. Cameron, were very much appreciated. Dr. Byron Rourke chaired my committee and acted as supervisor throughout this project. His insight and wisdom have been invaluable. He has my deepest regard for the support and loyalty he shows to his students. An individual to whom I am indebted is Darren Fuerst. His knowledge of statistics and the academic process in general have been indispensable.

Finally, I thank Judy and Larry Smith for their ongoing support which has aided me in all of my endeavors, academic and otherwise. My achievements are their achievements.

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CHAPTER 1

INTRODUCTION

The goal of the present study is to assess the effects of diagnostic group, and time in an early intervention program, on mother-infant interaction. Three groups of developmentally delayed infants will be utilized: Down syndrome, neurologically impaired, and delayed for unknown etiology. Each infant took part in a much larger study assessing the effects of child, parent and service variables on successful outcome from early intervention. The infants in the study were assessed prior to entry into the early intervention program, and one year after entry. Changes in the outcome measure over time will be assessed. This particular study focuses specifically on outcome in terms of mother-infant interaction.

The study of mother-infant interaction has implications for the child's later development. It is the opinion of those in the field that "maternal influences on infants produce significant lasting change and that long-term influences of "normal" maternal behaviour during infancy may ensure against major emotional disturbances, while insufficient, distorted or faulty maternal behaviour may lay the foundations for severe psychopathology in older children and in adults." (Greenberg, 1971, p.393). Research has focused on learning more about the interaction so that clinicians will be better able to teach parents effective

ways of dealing with their children. This may increase parents capabilities by helping them elicit "positive responses from their infant." (Anderson & Sawin, 1983, p.367). Studies have illustrated that mother-infant interaction plays "a crucial role... in the infant's acquisition of communication and language skills." (Kysela and Marfo, 1983). Maternal stimulation of infants has been found to predict positive infant outcome measures such as complexity of play and mental age (Kysela and Marfo, 1983). Mother-infant interaction may also have detrimental effects on the infant. When the style of interaction itself is impaired, infants are affected negatively in terms of development (Kysela and Marfo, 1983). Taking these points into consideration, the topic of mother-infant interaction appears to be worthy of research. In order to more fully appreciate the need for the current research project it is important to review the literature on attachment, models of mother-infant interaction, interaction with infants who are developing normally, and with delayed infants. It is also important to look at how early intervention and mother-infant interaction have been linked in past literature.

Previous and Current Work by This Team

This team consists of a number of individuals primarily at the Hospital for Sick Children in Toronto, Ontario. Principal investigators in the project are Dr. Sharon Marcovitch, Dr. Daune MacGregor, and Dr. Sue Goldberg. The

research coordinator for the current project is Elizabeth Thompson. Since 1983 the team has been actively studying the socioemotional development of children with medical or developmental problems. Two longitudinal studies have been undertaken with this aim in mind. Both studies gather developmentally delayed subjects from three diagnostic groups: Down's Syndrome, Neurological problems, and unspecified (unknown) diagnosis. The first longitudinal study focused primarily on the prediction of later behaviour problems from early information on child temperament, medical factors, family functioning, and mother-child interaction.

The following is a brief summary of some interesting findings from this study which utilized preschool-aged children. Difficult child temperament was found to contribute significantly to mother's reports of poor coping (Marcovitch, Goldberg, Lojkasek, & MacGregor, 1987). Other temperament findings suggested that mothers perceived their delayed children as possessing "difficult" temperaments even when questionnaire responses indicated that these same children were classified as "easy" when compared to the norms (Marcovitch et al., 1987). Early and current child temperament were found to be associated with high levels of depression and social withdrawal in children. Also predicting this was current parenting stress and early familial support (Marcovitch, Campbell, Krekovich, Mantini-

Atkinson, Goldberg, & MacGregor, under review). Further results concerning the effects of stress noted a significant relationship between the perceived amount of social support and parent stress at school-age (Marcovitch et al., under review). Early mother-child interaction was not associated with later parenting stress but was predictive of current behaviour problems (Marcovitch et al, under review).

The second longitudinal study, of which the present study is a part, is examining the contributions of child, family, and service characteristics to the outcome of early intervention programs for the same three diagnostic groups of delayed infants over a one year period of early intervention. The subject population in this study is different from the first longitudinal study. The team was interested in both child and family outcomes of intervention for the three groups. Visits were made to the families on three separate occasions: an initial visit before they entered the early intervention program, six months after they entered the program, and one year after program entry.

The early intervention programs that the children were involved in were not curriculum-based or model-based. Rather each child received intervention that was specific to his or her needs. Three types of workers were involved: Physical and/or Occupational Therapists, individuals with Psychology training, or Early Child Education workers. Each worker designed a program to meet the needs of the child

involved. Both child and family goals were established. Examples of activities taking place in the programs were: skill teaching, physical or occupational therapy, family support, and agency information and coordination. The activities did not resemble direct therapy. Rather the parents took part in mediator training. The worker would teach the parents to administer the activities with their child. This allows the parent to continue working with the child after the worker is no longer involved.

One preliminary finding from this study which may prove extremely useful to those people designing early intervention on a weekly basis is the finding that the type of focus of the weekly intervention impacted on maternal stress. More specifically, mothers whose intervenors spent more time on the teaching of activities which would promote child skill development had lower stress levels at the six month evaluation than did mothers whose intervenors focused on generalized support. If this type of finding demonstrates continued stability one can envision how research such as this may influence the actual curriculum design in early intervention to more closely meet the needs of families. The findings also suggest that maternal stress and service variables may have an impact on the way a mother interacts with her infant, and that this needs to be addressed in future research.

Another encouraging finding was that family

satisfaction with intervention predicted positive change in child development over time. Those families who were more satisfied with the service they were receiving had children whose development was enhanced.

Program variables also proved to be predictive of outcome in other ways. The frequency with which family support issues were discussed in intervention and the nature and intensity of skill teaching were predictive of positive changes in child development and family functioning. All of these findings would suggest that it is important to include a knowledge of child characteristics, family characteristics and service delivery variables in developing models of early intervention, as each seems to contribute to its successful outcome.

The present project will complement the information gained from the rest of this longitudinal study. In the present study mother-infant interaction is explored in more detail. By doing so, it is hoped that it will lead to further study and understanding of what specific aspects of mother-infant interaction are related to success from early intervention. By learning which aspects of interaction improve with intervention we will be better able to instruct designers of intervention programs on which areas need further work and which needs are already being met.

Mother-Infant Attachment

The first major contributor to attachment theory in

human infants is Bowlby. When his theory of attachment was introduced it served as an alternative to psychoanalytic theories, which at that time (1950's and 1960's) stressed the importance of object relations (Bretherton, 1985). His ethological-evolutionary perspective stressed the fact that an essential part of the human experience was the process of becoming attached to a mother figure (Ainsworth, 1979). These previous theories could not account for children's responses to separation from their parents (Ainsworth, 1985). Bretherton (1985) states that Bowlby's theory can be interpreted in terms of a **goal-corrected control system.** Bretherton (1985) makes the following observations regarding this system: "from an outside observer's viewpoint the system's set-goal is to regulate behaviours designed to maintain or obtain proximity to and contact with... the attachment figure(s). From the psychological vantage point of the attached person, however, the system's set-goal is felt security." (p.6). It is important to note that the attachment relationship is distinct from other relationships the child has (i.e. a playmate relationship). A child would likely seek a playmate when happy, but a child will more likely seek an attachment figure when he or she is feeling frightened or upset (Bretherton, 1985). An essential element of Bowlby's theory is interaction between the infant and the attachment figure. If the child does not experience sufficient time in interactions with the caregiver, then an

attachment to that caregiver will not occur (Ainsworth, 1979). It is this element that links attachment theory to the present research project. The research interest in mother-infant interaction has gained more import in the literature largely due to its essential role in the formation of an infant's attachment to a caregiver. Both Bowlby and Mary Ainsworth, pioneers in the attachment literature, stress interaction as an essential component in their understanding of the attachment process.

Ainsworth has furthered the study of attachment by providing researchers with a laboratory method of observing behaviour between a child and his or her attachment figure. This method has become known as the "Strange Situation". In this method the child and the mother (attachment figure) are in a "laboratory" room with another individual who is a stranger to the child. It consists of seven 3-minute episodes during which the mother leaves and returns and the stranger leaves and returns (Wille, 1991). Observers are primarily interested in the behaviour of the child during separation and reunion with the attachment figure. Ainsworth (1985) notes that this method is valuable in that "it highlighted individual differences in the way infants had organized their behaviour toward attachment figures." (p.28). Three major patterns of infant behaviour toward the attachment figure became apparent from this research: (A) anxious-avoidant attachment, (B) secure attachment, and (C)

anxious-resistant (Bretherton, 1985). For a detailed description of these types (as well as the subtypes within each group) see Ainsworth's earlier work.

Research since Ainsworth's pioneering studies have focused on the usefulness of attachment classifications in the prediction of later behaviour (Ainsworth, 1985), the relationship between infant-mother interaction and attachment, and the behaviour of disabled or delayed infants in the Strange Situation. This brief discussion will focus on the latter of these three areas of interest.

The assessment of attachment has been attempted with delayed and handicapped infants as well as with normals. Studies have demonstrated that these infants can be reliably classified into Ainsworth's three categories of attachment security. Even children with physical handicaps can be reliably classified (Sierra, 1989). Much work has focused on the classification of premature infants. Goldberg, Perrotta, Minde, and Corter (1986b) studied the security of attachment in low-birth-weight infants (twins and singletons). Attachment was assessed when the child was one year of age. The authors found that prematurity did not appear to affect classification into Ainsworth's three attachment categories. The three "patterns of behaviour in the Strange Situation conformed to the frequencies predicted from prior full-term samples and were not affected by twinship." (Goldberg et al., 1986b), although the subgroup

patterns were slightly different. The majority of the infants developed secure attachments. The authors also found that maternal behaviour in the interaction sequences was predictive of the attachment category in which a child would later be placed. Infant behaviour did not yield such predictions.

A similar study by Plunkett, Meisels, Stiefel, Pasick and Roloff (1986) found discrepant results. In this study, prematurity did not always yield the same frequencies of attachment patterns as full-term infants. However, the methodology in this study improved upon the Goldberg et al. (1986b) study in one respect. This study divided the preterm population into those who were high-risk (i.e. respiratory illness and lengthy hospitalization) and those who were not. The healthy preterm group attained results comparable to Goldberg and her colleagues (1986b), whereas the high-risk preterm group "displayed a significantly different pattern of attachment that was more anxious-resistant (C)." (Plunkett et al., 1986). Results similar to the high-risk group in this study were found by Wille (1991) in her study of preterm infants and their attachment patterns. She too found a greater number of premature infants, when compared to full-term infants, who were insecurely attached. Wille (1991) suggests that these findings might be due in part to the lower socioeconomic status (SES) of the infants in her study. These three

studies stress the importance of recognizing the heterogeneity that exists within the delayed population, as well as external factors (e.g. SES) that may also contribute to attachment pattern classification.

Since Bowlby and Ainsworth both stressed the importance of mother-infant interaction in the formation of the attachment relationship, research has focused on the usefulness of interaction behaviours at predicting future attachment classifications. Recently, the predictive validity of mother-infant interaction has been questioned. Currently there is a growing body of researchers who are choosing to look beyond mother-infant interaction for predictors of attachment security. Interest in infant characteristics as predictors, specifically infant temperament, has resulted. There appears to be a controversy in the literature at present, with those stressing the importance of interaction on one hand, and those preferring to assume the influence of infant characteristics on the other hand. Some discussion of studies on both sides of this debate will follow.

Blehar, Lieberman, and Ainsworth (1977) studied early mother-infant interaction and its relation to later attachment security. Significant differences in interaction behaviours emerged for each of the attachment security classifications. For instance "mothers of infants who at the end of the first year were judged to be anxiously

attached more frequently initiated face-to-face interaction with a silent, impassive face and more often failed to respond to their babies' attempts to initiate interaction than did mothers of infants who were later judged to be securely attached." (Blehar et al., 1977). Similar results were found by Smith and Pederson (1988). Behaviour of mothers in an interaction setting was found to reliably predict the quality of infant-mother attachment. Ratings of maternal sensitivity during the interaction sequence was found to correctly classify the infants as securely or anxiously attached 94% of the time. Lewis and Feiring (1989) also found similar results. They too found that "[m]aternal interaction style at 3 months... was related to subsequent attachment quality." (p.60). Interesting to note was that maternal behaviour was found to influence later attachment classification more so than infant behaviour.

To address the other side of the controversy, a number of authors have looked at infant behaviour, specifically temperament, and its effect on attachment security. These researchers seem to be interested in no longer viewing attachment as purely a relational construct (Sroufe, 1985). Vaughn and Lefever (1989) assessed the relationship between the dimensions of the Infant Temperament Questionnaire (revised) (ITQ-R) and the Strange Situation classifications. The authors found that the temperament characteristics of the ITQ-R did not reliably predict attachment security as

assessed by the Strange Situation. Despite the lack of predictive validity, temperament was found to be related to some of the behaviours assessed in the Strange Situation. Sroufe (1985) agrees that a "strong temperament interpretation is without basis." (p.9). He suggests that the relational view of attachment has more supporting evidence than the temperament view but that does not rule out the fact that temperament does play a (limited) role in attachment security. Goldsmith and Alansky (1987) came to a similar conclusion after performing a meta-analytic study of various studies in this area. They suggest that both maternal interactional behaviour and infant temperament play roles in attachment security. They looked at nine studies, the majority of which "reported at least some positive findings in both areas, with the maternal findings somewhat stronger." (p.814).

It should be noted that various researchers have recognized the importance of child behaviour and temperament in predicting successful interaction behaviour (Baker, Clark, & Yasuda, 1981; Brownell, Taylor, Day, Brown, Kratzer & Camfield, 1989; Osofsky & Connors, 1979; Levy-Schiff, Sharir, & Mogilner, 1989). Taking the articles on attachment into consideration it is possible that there is a "causal" relationship between temperament, mother-infant interaction, and attachment security that exists in that very order. In other words, temperament (and other child

characteristics) may mediate attachment indirectly through their effect on interaction. This conclusion, however, is simply speculation and would have to be explored further through research.

Models of Mother-Infant Interaction

Mother-infant interaction has been a topic of interest to researchers for many years. Various theoretical perspectives have been utilized in the study of this area. Osofsky and Connors (1979) cite six different perspectives taken in the literature: eclectic, biological, psychoanalytic, behaviourist, Piagetian and ethological-evolutionary. The eclectic approach allows a researcher flexibility in analysis, while allowing one to work toward more firmly-based theoretical positions. Mother-infant interaction has also been studied with respect to its effects on biological factors. Neural plasticity is the assumption underlying this approach. Psychoanalytic supporters would study the mother-infant interaction in terms of object relationships and ego functions. Behaviourists use learning theory to explain that an infant sees his mother as a reinforcer. Piaget's approach sees the interaction as being influenced by adaptation to, and organization of, past experiences. Finally, mother-infant interaction can be studied in terms of the ethological-evolutionary view of attachment, which assumes that a child is born with instinctive tendencies which predispose him or

her to attachment with the mother.

Models of parent-infant interaction have changed over the years of its study (Marcovitch ,1983). Regardless of the theoretical assumptions, the parent was originally seen as the only active participant. In other words the infant was affected by the parent but not vice versa. Later approaches recognized that the infant did indeed affect the behaviour of the mother. Currently, mother-infant interactions are seen as reciprocal. Each member of the dyad influences the other, and the result is that each behaviour is paced according to the reaction of the other dyadic member. A synchrony is established between mother and child (Condon, 1977). Bidirectional models assert "that changes in the developing organism and in the social environment are mutually supportive: the behaviours of each partner complement those of the other, and changes in one promote changes in the other." (Green, Gustafson, & West, 1980).

Some models are geared specifically toward gaining a better understanding of the dynamics in families with a developmentally delayed or disabled child. Recent models developed to understand families and their handicapped infants have focused on the variables that contribute to the family environment. Patterson and McCubbin (1983) discuss the Double ABCX model of families coping with a child with chronic illness. They suggest that a family's vulnerability

to a crisis (X) is influenced by the interaction between the particular stressor (A) the family's existing resources (B) and their perception of the stressor (C). The term "double" was applied to the model when the element of time was considered. Over time there is a pile-up of stressors (aA). New resources are added to the existing resources (bB), and the family begins to redefine the total situation and forms new perceptions (cC). Finally, adaptation to the total situation takes place (xX). An important element in this model is coping.

The specific relations between these first four variables (stressor, resources, perception and crisis) needed to be clarified if this model was to be of any use for intervention purposes. With this in mind Orr, Cameron and Day (1991) attempted to examine the relationships among the variables in the model using path analytic techniques. The results of the study suggested that the variables are causally linked, and "can be viewed as a linear chain following an ACBX path." (Orr et al., 1991, p.448). The findings can be viewed in terms of their implications for early intervention with handicapped infants. The authors state that "it seems reasonable that the effectiveness of resources in reducing stress in families caring for a child with mental retardation is going to be dependent upon how the family/parent defines and interprets the child's needs, level of functioning, problem behaviours, and other

idiosyncratic characteristics." (Orr et al., 1991, p.448). Although mother-infant interaction is not specifically addressed in this model, the way a family copes with the stress involved with caring for a disabled child would seem to be logically related to how that family learns to interact with the child.

Another model which expands on the Double ABCX model is specified by McCubbin (1989). She speaks of her findings on families with handicapped children coinciding with the Typology Model of Adjustment and Adaptation. In addition to those variables in the Double ABCX model, **family type** is seen as an important variable which affects family adaptation. This new model depicts "the family variables of stressors and demands, resources, family appraisal, and coping as critical factors influencing the family's adaptation to stressful life events over time." (McCubbin, 1989, p.108). One could hypothesize that families coping with delayed children of different diagnostic groups could potentially be considered as families of a different "type". Different environmental factors will affect each type of family. For example, the families of infants with Down's Syndrome would likely experience the initial stress of the diagnosis but will be more informed as to what to expect from their child than the parents of a child who is delayed for an unknown cause. In the latter case, the stress experienced has to do with a lack of information that could

help the family in learning what they can expect from their child. Diagnostic group differences in interaction could be expected according to this typology model.

As a final note on models, Kysela and Marfo (1983) point out that the literature on early intervention suggests a shift in trends from an emphasis on parent-as-teacher models to an emphasis on parent-infant interaction models. Despite this shift, little research has been performed to confirm the significant effect of the parent-child dyad on the success of an early intervention program. One model that appears to epitomize this particular theoretical viewpoint was proposed by Sameroff and Chandler (1975, as cited in Kysela and Marfo, 1983), and is known as the **transactional model.** This model "recognises the continual and progressive interaction between the organism and his environment. The child's response is more than just a simple reaction to his environment: it should be seen in the light of its power to affect and restructure the environment." (Kysela and Marfo, 1983, p.206). The transactional model considers both the risk status of the infant and family psychosocial factors to be predictors of infant development (Crnic and Greenberg, 1987). The model operates through a "complex feedback system, in which characteristics of the child and the environment reciprocally affect one another over time." (Crnic and Greenberg, 1987, p.345). This model also assumes that each

mother-infant dyad will operate differently, thereby stressing the need for intervention programs that recognize the individual differences in dyads. One implication of this model is that more research is needed on mother-infant interactions with delayed infants in order to yield information that may be helpful in designing individualized intervention programs for delayed infants.

All of these recent findings would suggest that in the future, researchers should use expanded models when assessing the relationship between parents and their handicapped children. It is not enough to study an interaction sequence alone; one must take into consideration variables in the family's environment and the child's constitution that might affect the interaction. In the case of the present research, both child and parent variables are considered as possible contributors to the mother-infant interaction. The child variable under consideration is diagnostic group, and the parent variable is the amount of time the parent has been exposed to the resources available from the early intervention program.

Mother-Infant Interaction Research with Normal Children

Mother-infant interaction research has focused on families of normal infants as well as those of handicapped infants. Research with normals has demonstrated that interactions between mother and infant are originally wrought with apprehension and feelings of helplessness

(Greenberg, 1971). With time however, mothers become more skilled and admit to enjoying interactions with their infants. Researchers have demonstrated that maternal responsiveness and skill at dealing with an infant can be enhanced with early intervention by professionals. Anderson and Sawin (1983) demonstrate that positive changes in maternal-infant interaction are seen when mothers observe the Brazelton Neonatal Assessment Scale being given to their infants as well as have the results explained to them. Therefore, the mother who is more familiar with her child's characteristics and capabilities can demonstrate enhanced responsiveness to her child's cues during interaction.

Studies with normal infants also highlight the view that interactions are reciprocal (Heckhausen, 1987; Murray & Trevarthen, 1986); both the mother and the infant are active participants in communication. Murray and Trevarthen (1986) videotaped the infant during interaction with its mother. The mothers then were asked to interact with their child on a video screen in a live setting as well as a taped presentation. The mothers believed that both sessions were live. The mother's baby talk was analyzed in terms of utterance type and complexity, and was found to differ between the two occasions. Due to the fact that infants were responsive only in the live session this indicated that "infants play an active communicative role in the interaction, and that features of the mother's baby talk are

at least partially adaptations to such a capacity." (Murray & Trevarthen, 1986, p.24).

Infant development also appears to mediate interaction (Heckhausen, 1987; Green, Gustafson & West, 1980). Not only does an infant's level of development affect mother-infant interaction (Green et al., 1980), but also mothers are able to challenge their child's developmental potential through that same interaction (Heckhausen, 1987). Green and his colleagues (1980) demonstrated that the changing social and motor capabilities of an infant have a direct impact on how that same infant interacts with his mother. For example, as infants develop they initiate more interaction sequences and mothers issue more verbal requests. In addition to clarifying the role of an infant's developmental abilities in determining the interaction, this study also demonstrated "that there are consistent differences among infant-mother dyads across time." (Green et al., 1980, p.199). Heckhausen (1987) demonstrated how mothers can enhance development in their infants through the interaction process. Through changes in their behaviour, mothers were able to balance for their child's weaknesses as well as challenge their developmental potential. Heckhausen (1987) showed that mothers followed a "one-step-ahead" model by putting "substantial effort into supplementing their infant's motivational guidance of actions as well as into the mastery of task-specific

skills." (Heckhausen, 1987, p.768).

Mother-Infant Interaction with Handicapped Infants

The fact that infants' developmental level plays a significant role in mother-infant interactions with normal children has implications for interactions in the population of developmentally delayed and disabled infants. Mothers of delayed infants may benefit from training using a one-step-ahead model such as that discussed above. Mothers may be able to enhance their child's development through the interaction process. To this end, much research has been done with children with handicapping conditions. Some aspects of mother-infant interaction with delayed infants have been demonstrated to be predictive of infant functioning (Kysela and Marfo, 1983). The interaction research with handicapped infants deals with premature infants, infants with Down's Syndrome, physically handicapped infants, and those delayed for other reasons.

Resnick, Armstrong and Carter (1988) report on an intervention program that was designed to enhance development of premature infants as well as improve the quality of communication between these infants and their parents. The program resulted in improvements in infant mental age and improved quality of interactions between infant and parent. The study fails to point out, however, which specific interventions performed, had the most impact on their findings. Future studies should provide a

breakdown of the services provided so that their specific contributions to successful treatment can be determined. Researchers should attempt to discover which aspects of intervention are most helpful to which kind of children so that intervenors can be more informed as to what activities they should introduce to help each specific family. The larger research project of which this particular study is a part, is taking into consideration the specific service variables that are affecting the success of the intervention program.

Development also appears to play a role in how premature infants and their mothers interact. As with normals, gains in development of preterm infants affected their interactions with parents (Beckwith, Cohen, Kopp, Parmelee & Marcy, 1976). As developmental quotient and sensorimotor scores increased infants received less physical care, had more floor freedom, engaged in more mutual gazing and smiling and exhibited more general attentiveness. One difficulty with this study is that the infants were tested at equivalent conceptual ages (i.e. testing time was determined for each child as 1,3,and 8 months from their **expected** dates of birth). This creates a problem since some children were more premature than others and therefore had more time to engage in mother-infant interaction. It is difficult to know from this study whether the amount of mother-infant interaction had an affect on the results. It

might be helpful to replicate the study using chronological age to see if the findings are consistent. Despite the difficulties, these studies suggest that mother-infant interactions are important in enhancing and measuring development in premature infants.

Landry and Chapieski (1989) studied differences in mother-infant interaction between premature infants and infants with Down's Syndrome. Mothers of the two groups used different attention-directing strategies with their infants. These strategies were related to the infant's attentional capacity. It was also shown that each group of infants demonstrated different patterns of responses to the methods the mothers used to direct attention. This study highlights the importance of viewing the delayed population not as one group, but as a heterogeneous population to be conceptualized in terms of specific subgroups of disability or developmental delay.

Several studies of interaction between mothers and Down's Syndrome infants find intraindividual differences (even within these subgroups of handicapped children), in maternal interactional styles (Crawley and Spiker,1983; Atkinson, Scott, Goldberg, Bowman, Blackwell and Dickens ,1990). Atkinson and his colleagues (1990) found that characteristics of the mother (i.e. cognitive coping style and affective adjustment) affected sensitivity towards their infants in an interaction setting. Severity of handicap may

also contribute to the heterogeneity found, as the cues of severely handicapped infants may be more difficult for their mothers to interpret (Yoder, 1987).

As with normal and premature infants, development of infants with other handicaps can be enhanced with early intervention techniques addressing mother-infant interaction. Blasco, Hrncir and Blasco (1990) showed that mothers of infants with Cerebral Palsy who adapted their behaviour when interacting with their infants, aided their infants in achieving mastery. If mothers could be taught how to adapt their behaviour to the needs of their children then interactions, and possibly development, would be enhanced. Rosenberg and Robinson (1988) bring up an important point and state that intervention can enhance mother-infant interaction but that this must be specifically addressed in treatment. Those techniques designed to enhance infant development may not necessarily improve interactional skills. The effects of specific techniques in service delivery on mother-infant interaction has rarely been systematically studied. Mahoney and Powell (1988) examined an intervention technique designed specifically to address issues of interaction with handicapped children. Their data indicated that interaction can indeed be enhanced but that a parent's motivation to follow the suggestions of intervention is an important variable in determining its success.

Lojkasek, Goldberg, Marcovitch and MacGregor (1990) studied a specifically defined aspect of mother-infant interaction in the developmentally delayed population. Three diagnostic groups of handicapped children were studied: Down's syndrome, neurologically impaired, and delayed due to unknown etiology. The authors attempted to isolate a cluster of interactional behaviours which they felt represented maternal responsiveness. The mothers in their study were considered responsive if they were "given higher ratings on scales that reflect awareness of child abilities and needs and the spontaneity and pleasure with which [they did] so." (Lojkasek et al., 1990). The authors felt that maternal responsiveness in interactions with their children could be measured using five variables. The first was **positioning.** A mother was seen as more responsive if she positioned herself well in the interaction situation, allowing for a view of the child's activities and for social interactions. The second variable was **facial expressions.** Responsive mothers were those who exhibited animated facial expressions. **Vocal expressions** were recorded such that mothers who demonstrated free and varied speech were scored as more responsive. **Vocal appropriateness** was also considered. When a mother geared language to her child's developmental level she was seen as more responsive. Finally, the mother's **pleasure** with her child was considered. Mothers who exhibited praise, joy and laughter

were scored as being more responsive.

Lojkasek and his colleagues (1990) performed extensive regression analyses to assess the effects of mother variables, father variables and child variables on the measure of maternal responsiveness. Diagnostic group did not appear to affect outcome. Significant predictors of maternal responsiveness in mother-infant interactions were representative of each of the above mentioned variables. The authors concluded from the analyses that "[m]others who had older spouses, more responsive children, and more support and were older themselves were rated more responsive." (Lojkasek et al., 1990, p.269). The results of this study would suggest that further research on maternal responsiveness (a component of mother-infant interaction) should take into account the whole family system, rather than simply address the mother's role alone. The authors stress that "interventions to enhance maternal responsiveness are likely to be most effective when the family system is considered." (Lojkasek et al., 1990, p.270).

Something that is lacking in the research with handicapped children is thought regarding the considerable variability present in this population. To properly study the effects of intervention on mother-infant interaction, while at the same time appreciating the heterogeneity of the disabled population, researchers must look at intervention

effects on specific subgroups of handicapped infants. This would lead to more specific treatments so that each group would receive the most benefit. When grouping according to medical category has occurred in the delayed population, different outcomes have been demonstrated according to diagnosis; specifically with respect to intellectual and motoric developmental outcome (Landry, Fletcher, Zarling, Chapieski, Francis & Denson, 1984). This particular study demonstrates that very low birthweight infants "are not at equal risk for developmental problems. The need for early intervention is determined in part by specific medical complications at birth." (Landry et al., 1984, p.399).

Research Comparing Mother-Infant Interaction in Normal and Handicapped Children

A number of studies have attempted to illustrate comparisons between the mother-infant interactions of normal infants and those of handicapped infants. The normal population often acts as a control group. Despite the merits obtained from knowing how handicapped infants and their mothers differ from their normal counterparts, the idea that variation exists within handicapped populations is too often overlooked.

The normal/handicapped comparison literature frequently addresses the issue of directiveness. Mothers of handicapped children are seen as more directive, or controlling, in their interactions with their infants

(Hanzlick & Stevenson, 1986; Cunningham, Reuler, Blackwell & Deck, 1981; Tannock, 1988; Garrard, 1989). The positive, versus negative, influence of directiveness on child development is currently being debated. Mahoney and Powell (1988) found that lower ratings of directiveness were associated with more success in interaction, whereas Crawley and Spiker (1983), in their study of Down's syndrome infants, suggest that directiveness in a mother may be a positive characteristic when combined with sensitivity. The maternal characteristic of sensitivity may, therefore, be the factor which determines whether or not directiveness has a positive or a negative effect on an infant (Hanzlick, 1990). Verbal mother-infant interactions also differ between handicapped and normal children with respect to rate. Mothers of Down's Syndrome infants speak to their infants at a significantly faster rate (Buckhalt, Rutherford, & Goldberg, 1978).

Other comparison research has focused on aspects of interaction that are less dependent on verbal communication (Hanzlick, 1990; Berger & Cunningham, 1981). Hanzlick (1990) compared the nonverbal interaction patterns of mothers and their infants with cerebral palsy to that of normal infants and their mothers. Results indicated that the majority of maternal behaviours directed towards infants with cerebral palsy were couched in physical directiveness. This was in contrast to normals. Results also indicated

that mothers "of infants with no delays decrease both physical contact and the amount of directive physical guidance they engage in as their infants' [mental age]'s increase; mothers of infants with cerebral palsy do neither." (Hanzlick, 1990, p.340). Berger and Cunningham (1981) also found differences in nonverbal interaction patterns (specifically eye contact) between normals and delayed (Down's Syndrome) infants. Although the amount of eye contact was comparable between the two groups, the pattern of development of this behaviour differed significantly. The delayed infants demonstrated delays in the onset of eye contact and also in the "development of new functional uses of eye contact, implying impairments in both maturational and psychological processes." (Berger and Cunningham, 1981, p.678). Both of these studies demonstrate that delayed infants differ from normals in terms of nonverbal communication patterns in mother-infant interactions. Because differences are found between delayed infants and normal infants one might also hypothesize that differences will be observed within the delayed population itself due to the heterogeneity which exists between members of this diverse group.

Mother-Infant Interaction and Early Intervention

As mentioned above, early intervention techniques have been demonstrated to contribute to later successful mother-infant interaction. Rosenberg and Robinson (1985) designed

an infant education program specifically for this purpose. The study involved mothers taking part in a training program. Mothers were observed interacting with their children, during which time the intervenors noted which particular interactional behaviours needed to be improved. Mothers then went through a number of training sessions where the intervenor modelled the appropriate interactional behaviour with the infants, and the mother was required to imitate these behaviours. Results indicated that regardless of amount of time enroled in the program and infant handicap severity, mothers' interactional ability showed significant improvement.

There is one methodological difficulty with this study. The authors chose to use an instrument known as the **Teaching Skills Inventory** for both the task of choosing particular skills that needed improvement, and for the task of assessing improvement in those skills. There is a confound inherent in this method. The authors were guilty of "training to the test". In other words, the skills being worked on in the training sessions, were also the same specific skills on which the mothers would later be assessed. Anastasi (1988) addresses this issue and states that "[i]t is obvious, too, that the closer the resemblance between test content and coaching material, the greater will be the improvement in test scores." (p.43). The results in this study may partially be an artifact of the testing

method. Ideally, the assessment of mother-infant interaction outcome should have utilized a separate and unbiased measure. Future research in this area may choose to use the Teaching Skills Inventory to identify areas that need improvement, but a separate measure of interaction outcome should be used to avoid "teaching to the test". This argument does not hold of course in clinical situations. In fact, the use of the Teaching Skills Inventory for both purposes (identification of difficulties, assessment of outcome) would be valuable and easy to use for intervenors in the home. It is simply suggested that the use of one measure for both purposes in research is methodologically unsound.

Mother-infant interaction was also seen to be a legitimate focus of early intervention in a study performed by Mahoney and Powell (1988). The study attempted to ask the following questions: "can intervention practices help parents become more responsive and child oriented in their daily interactions with their children? Will enhanced levels of parent responsiveness and child orientation be associated with higher levels of child functioning?" (p.83). These questions were addressed by involving parents of handicapped children in a Transactional Intervention Program (TRIP). The two areas specifically addressed by this program were **turn taking** and **interactive match**. The turn taking training stressed the parents' timing and

interactional balance with their children. Interactive match refers to the ability to adapt parenting style to the child's pace and level of development.

The study used the families of 41 handicapped children. The type of handicap varied but the possible heterogeneity of the population was ignored in the analysis. The children were not divided into subgroups dependent on diagnosis. The results indicated that the parents learned to use the strategies they were taught (turn taking, interactive match). Interaction between parents and infants, therefore showed improvement. The parents who were found to be "most effective at using the TRIP strategies of Turn taking and Interactive Match were highly responsive and sensitive and relatively nondirective in their interactions with their children." (Mahoney and Powell, 1988, p.89). This finding supports that of Lojkasek and his colleagues (1990) in terms of the important contribution of maternal responsiveness to interaction. Mahoney and Powell (1988) also found that the rate of child development increased during the intervention program, providing evidence to support the findings of Heckhausen (1987) who stated that mother-infant interaction aided child development. This finding also indicates that directive techniques are not necessary antecedents to a child's developmental gains.

The findings of Rosenberg and Robinson (1985) and Mahoney and Powell (1988), were supported by another study

assessing the effects of intervention on mother-infant interaction. Resnick, Armstrong, and Carter (1988) performed a study with premature infants. Families in the treatment group received early intervention as early as their stay in the hospital. The intervention strategies were different from the previous two studies mentioned. Rather than each family undergoing the same procedures, the intervention was instead specific to the child's medical problem. The home visits involved the intervenor modelling intervention activities so that the parents could learn particular strategies to use. Child development was also assessed during these visits.

The outcome measures in this study addressed child development and interaction. Results indicated that the children in the treatment group demonstrated more advanced mental abilities than those in the control group. This finding again lends support to the idea that early intervention is a powerful predictor of successful child development. The authors suggest that the results also indicate "that the higher quality of parent-child interactions probably held the key to these cognitive gains." (Resnick et al., 1988, p.77). It appears that the gains in development did not occur without corresponding gains in parent-infant interactional skill.

The findings from these three studies have demonstrated that early intervention can be a valuable tool used to

increase mother's competence in their interactions with their delayed infants. There is also evidence to suggest that the improved interactions contribute to the child's developmental gains.

Summary of Research Findings

Research in a variety of areas has been addressed in the preceding discussion. It seems that mother-infant interaction is presently seen as reciprocal with both parties affecting the behaviour of the other. Interaction has been found to influence the development of the children involved in early intervention programs. The literature suggests that the delayed population is a heterogeneous one, and this needs to be taken into consideration in future studies. A number of studies have indicated the effectiveress of early intervention programs in contributing to successful mother-infant interaction.

Rationale

Early intervention has been seen to have a significant positive influence on mother-infant interaction (Rosenberg & Robinson, 1885; Mahoney & Powell, 1988; Resnick et al., 1988). The present study will also attempt to assess early intervention effects on interaction, however, one improvement will be made from the Rosenberg and Robinson (1985) study. These authors were guilty of "teaching to the test"; the present study will avoid this. As did Resnick and his colleagues (1988), this study will utilize

intervention strategies specific to each child. The intervenors will have had no exposure to the rating scales used to assess interaction. This will ensure that the intervention strategies are not specifically aimed at those items on the outcome measure. This will avoid Rosenberg and Robinson's methodological mistake. One would expect that similar results will be found to the three above mentioned studies. In other words, it is expected that in all diagnostic groups, significant improvement in mother-infant interaction will be observed, as measured by the changes observed in the outcome measure over time.

The second specific issue to be addressed is that of diagnostic group, and the effect of this variable on mother-infant interaction. Diagnostic group has been demonstrated to be an important determinant of outcome (Landry et al., 1984). Kysela and Marfo (1983) stress that research on mother-infant interaction must recognize that retarded infants are not a homogeneous group. By considering them as homogeneous "this approach does not pay attention to differences among retarded and nonretarded children, as well as among their mothers, which lead to unique interaction styles among dyads." (Kysela and Marfo, 1983, p.205). Some studies have recognized the potential contribution of diagnostic group as a convenient way to appreciate individual differences among the delayed infant population.

Lojkasek and his colleagues (1990) in their study of

delayed preschoolers expected to find differences in maternal responsiveness according to diagnostic group. Their rationale was that "the family history relating to identifying, diagnosing, and responding to children's delayed development differs for delays of differing etiologies." (p.262). Since Down syndrome children are usually diagnosed before neurological and unknown etiological difficulties, the parents of these infants have more opportunity to obtain information about possible outcome, and they also have more opportunity to seek external resources and supports. The parents of the children with neurological difficulties and delays of unknown etiology receive diagnoses later in their child's development, and therefore receive fewer services early on. These difficulties in addition to the greater stress seen in parents of children with more uncertain diagnoses, would lead one to suspect that mother-child interaction with Down Syndrome children would show more improvement (Lojkasek et al., 1990). Lojkasek and his colleagues (1990) did not find any differences between diagnostic group in terms of improvement in interaction. It is possible that the reason for the lack of differences is that the subject sample consisted of preschool children. Usually by this point the diagnosis is more firm and the parents of children in each group have had the opportunity to adjust to the situation, even if the diagnosis came relatively late in one group or

another. Because the children in the present study are infants, the parents will not have had this adjustment period. It is expected therefore, that the diagnostic group differences in mother-infant interaction that Lojkasek and his colleagues (1990) did not find, will be demonstrated in the present study. It is hypothesized that the Down syndrome group will show greater improvement over time in mother-infant interaction than the Neurological or Unknown etiology groups.

This hypothesis is consistent with the findings of Goldberg, Marcovitch, MacGregor, and Lojkasek (1986) who found that the Down's Syndrome group functioned better in terms of stress experienced and social support available, when compared to the Neurological and Unknown diagnostic groups. Other researchers have also found that families of children with Down Syndrome, report the fewest problems when compared with other populations of delayed children (i.e. autistic children) (Holroyd and McArthur, 1976, as cited in Goldberg et al., 1986b). These findings would lead one to expect mothers of Down's Syndrome infants to be better able to interact with their child because they experience less stress and have more support than their counterparts with children in other diagnostic groups.

Hypotheses

As discussed above, the following hypotheses are being proposed:

1. Positive changes will be observed in mother-infant interaction over time for all diagnostic groups.
2. The Down syndrome group will demonstrate higher ratings on the outcome measure of mother-infant interaction at both times as compared to both the neurological group and the unknown group.

CHAPTER II

METHOD

Subjects

Seventy-eight families with developmentally delayed children enroled in an early intervention program were subjects. Of primary interest in this study are the 78 mother-infant dyads. Information was collected on some of the fathers, however, the data was too inconsistent to be reliably used in an analysis. For instance, of the 78 families only 32 fathers had videos taken. Only 18 of these 32 had completed videos at time one and at time two. Therefore, it was decided to use information from the mother-infant dyads only. There has been some interesting research on mother-father-child triads. In particular McDermott (1977) noted that mothers and fathers can demonstrate differing interactional styles when interacting with learning disabled boys. Future research with more complete father data should pursue this area of triadic interaction.

The average age of the infants upon entry into the program was 6.3 months, with a range of 2 weeks to 18 months. The families had infants in one of three groups: Down's Syndrome, neurologically impaired, or delayed due to unknown etiology. These three groups were included because it is important to recognize the heterogeneity of the delayed population. Diagnostic group differences expected

in the analysis would not be found if all subjects were simply given the label "developmentally delayed". Each child's file was reviewed by a pediatric neurologist, and upon her recommendation, was placed in the diagnostic category which reflected his or her specific disability. Upon completion of the study there were 24 children with Down syndrome, 38 children with neurological difficulties, and 16 children with delays of unknown etiology. The subjects were drawn from two "infant development programs" operating in the Metro Toronto area; the Durham Infant Development Program and the Peel Infant Development Program. Children who entered the program between birth and 18 months of age were eligible to be included in the study. To be included it must have been anticipated that the child would remain with the infant development program for at least one year, and the families must speak fluent English so that questionnaires could be read without difficulty. Families involved in these programs came from a wide range of socioeconomic backgrounds as rated using the scales developed by Blishen (1976) based on occupation. There was no fee for the programs. There is a range of developmental functioning among the infants and comparability of functioning amongst the three groups.

A normal control group was not included for a number of reasons, the first of which being that normal infants do not usually take part in early intervention programs. Inclusion

of a normal control would have placed unnecessary pressure on the, already strained, resources of the infant development programs. This option was therefore impossible from a pragmatic viewpoint.

Another reason for not including a control group is that it was seen as unnecessary. Meisels (as cited in Mott et al., 1986) states that traditional treatment/control group designs are inappropriate when the real interest lies in whether or not an early intervention program has been successful. Previous studies have assessed the differences between normals and handicapped infants (as reviewed above). This is not the important issue at present. We are more interested in assessing the heterogeneity present in the delayed population that has gone relatively unnoticed up to this point in time.

Procedure

The present research project is part of a larger study that is in the process of being completed. This project is discussed above in the introduction as the "second longitudinal study". It was the purpose of the present investigation to analyze data that has not already been utilized to date. The names of the principal investigators and research coordinator are listed above. A number of research assistants at the graduate and undergraduate level were also involved in the management of the database. The author of the present manuscript was involved as a research

assistant on the project for the last two summers of her undergraduate degree. In addition to database management, she also scored questionnaires, performed literature searches, and accompanied the research coordinator on a few of the home visits.

The first stage of the project required the research coordinator to look through the files of the to-be-acquired families in the two infant development programs and choose those families who met the criteria for inclusion in the research project. The families were then approached to assess their interest in being involved in the research project. The study was described to them. It was explained that they would be visited on three occasions by the research coordinator at which time they would be required to complete a number of questionnaires as well as take part in a videotaped parent-child interaction sequence. The families were not paid for participation, however, a copy of the videotape of the interaction sequences was made for them if they so wished.

The first visit in the study took place in December of 1987, and the last visit was completed in July of 1991. Upon verbal consent, the first visit with each family was scheduled. This visit took place before the family entered the early intervention program. On most occasions the mother was the only parent present. When the father was present, he also, took part in a videotaped interaction

sequence. Because data was sparse where the fathers were concerned, only the mother-child interaction data will be utilized. On the first visit the parent was given a letter describing the research project (see Appendix A). If the parents agreed to participate they were required to read and sign a consent form (see Appendix B). After this task was completed the parents took part in a standardized interview with the research coordinator. The package of questionnaires was distributed and instructions for filling out each of them was provided. The questionnaires assessed such areas as: child temperament, developmental functioning, parental self esteem, locus of control, family functioning and satisfaction with service delivery. In addition, service-intensity, -frequency and -goals are documented.

The next stage of the visit involved the videotaped interaction sequence. For the first few subjects, the parents were instructed to play with their child for 10 minutes. These instructions were found to be too vague; the parents often did not know what to do for 10 minutes. In order to provide added structure to the task, for all other subjects, the videotaped encounter was divided into three 3-minute sequences. Instructions for each segment were given in full before the videotaping began, as well as at the beginning of each separate segment. For the first sequence the parents were instructed to play with their child with any 3 of the toys provided by the experimenter. The toys

provided were of a number of different developmental levels (e.g. a puppet, blocks, books, etc...) such that parents were given freedom to choose what they felt appropriate. For the second sequence the parents were told that they could use any toy(s) that they wanted to, including their own, to play with their child, or else they did not have to play with their child at all, as long as they remained within the range of the camera. For the final sequence the parents were told to do something with their child that they both enjoyed. This could be an activity with or without toys and often took place in a different room of the house. One father chose to play with his child in the bath and donned bathing trunks. Other activities ranged from feeding, to singing, to diapering and dressing.

The visits were repeated at 6 months and 1 year after entry into the early intervention program. Each visit followed the same procedure as described above, although some questionnaires were added, deleted, or substituted, depending on which visit was taking place. The video scoring measure, and the format of the taping were the same for each of the three home-visits.

The present study used this data, collected previously, to assess differences between the three groups of subjects in terms of mother-infant interaction. This study used the interaction data from the initial visit and the one year visit as outcome measures.

Instruments and Measures

The mother-infant interaction data has been scored using a measure compiled by the investigators (see Appendix C). On the basis of a literature review and clinical impressions of important aspects of mother-child interaction, the investigators developed a set of rating scales (Marcovitch, 1983). They include measures of both child and parent behaviours. The parent rating scales are as follows: turn-taking, control, positioning, facial expression, vocal appropriateness, vocal expression, pleasure with child, displeasure with child, use of developmentally appropriate materials, adaptive behaviour, physical contact, choice of a special activity, and enjoyment of a special activity. A parent summary score is obtained by adding the parent ratings (with correction for those in which the midpoint is optimal). The child rating scales are as follows: facial expressiveness, smiling, maintaining eye contact, degree of vocalization, and activity level of child. In addition to this, two questions at the end of the instrument qualitatively assess the state of the child initially and predominantly in the interaction sequence, although these questions were not used in the analysis. Each play episode is rated separately from videotape. Summary parent scores for individual episodes as well as ratings of individual maternal behaviours will be used in analysis. Scoring of the videotapes was performed

by two independent raters who were blind to the hypotheses of the study. The raters were tested periodically to ensure inter-rater reliability. They consistently reached reliability criterions of over 90%. The present study will involve extensive analyses performed on this data.

The measure was used originally in the dissertation of one of the principal investigators (Marcovitch, 1983). In this form, the instrument was designed for young preschool children. The research coordinator for the project, Elizabeth Thompson, adapted that version of the measure for use with infants. This was done in part by using concepts from the work of Mary Ainsworth in the area of attachment. Of particular assistance was Ainsworth's work in the area of feeding behaviours. At this point, Ms. Thompson and Dr. Goldberg changed the scale items to fit a Likert format with 5 being the optimal score. The measure was pilot tested on a few infants, and then Ms. Thompson was trained on proper scoring techniques. Ms. Thompson, in turn, trained the two independent raters such that her scoring was used as standard. As noted, the raters obtained reliability coefficients of .90 and above.

A summary score for the parent behaviours has been calculated by summing all of the individual parent behaviours. The merits of adding these behaviours together to yield an overall rating of the parent's role in interaction has been questioned. As this is an exploratory

study, it is unclear if this is an adequate way to test a parent's "interactional ability". To avoid misinterpretation of the parent total score, analyses will utilize the individual behaviours in the instrument as outcome measures, as well as this summary score.

Data Analysis

A number of analyses were performed on the data. First, difference scores were calculated for each subject on each dependent measure. These difference scores were calculated by subtracting time 1 scores from time 2 scores. For those difference scores that were positive (indicating positive changes over time), dependent measure t-tests were performed in order to determine if the positive change was statistically significant. These analyses adequately tested the first hypothesis; they indicated whether or not positive changes in interaction were indeed observed.

To test the second hypothesis, planned comparisons were performed. The comparisons, at time 1 and time 2, contrasted the mean of the Down's Syndrome group with the average of the means for the Neurological and Unknown groups. Significant differences between these two values were expected. If these differences are found, then the hypothesis that the Down's Syndrome group will demonstrate higher ratings than the other two groups at both times, will be confirmed.

Due to the exploratory nature of this study there were a number of dependent variables tested. There was a strong possibility that some of these may be significantly correlated, such that interpretation of the results may have been difficult. In order to determine if the dependent measures were indeed correlated, a Principal Components Analysis was performed. The results of this analysis yielded interpretable components so the *t* tests and the planned comparisons discussed above were repeated, using the component scores generated rather than the difference scores used above. The same hypothesis was tested. The nature of a Principal Components Analysis is such that the components generated are not correlated, making results more interpretable.

CHAPTER III

RESULTS

The results that will be presented are as follows. The difference score analysis will be discussed first. The *t* test analysis on the positive values obtained from the difference score analysis will then be discussed. These two analyses address the first hypothesis. The planned comparisons, which address the second hypothesis, will be discussed next. The results of the principal components analysis will then be presented. The *t* tests and the planned comparisons were re-run utilizing the factors from the principal components analysis as dependent measures. The results from this second set of analyses are reported next. Finally, a post hoc analysis of specific diagnoses in the Neurological group will be discussed.

Scores on each of the 19 dependent measures at time 1 and time 2 were available for each subject. In the first analysis difference scores were calculated for each subject using these two scores. The mean difference score for each diagnostic group on each of the 19 dependent measures was then calculated, where positive difference scores suggested positive change over time in the area measured by that particular dependent measure. See Table 1 for a listing of these difference scores, as well as the mean scores for each group at time 1 and time 2. Further analyses were performed only on those difference scores which indicated positive

Table 1

Mean Scores at Time 1 and Time 2 Out of a Possible 5 and Mean Difference Scores for Each Diagnostic Group

Dependent Measure	Down's			Neurological			Unknown		
	t1	t2	diff	t1	t2	diff	t1	t2	diff
Turn taking	1.08	2.92	1.83	1.47	2.53	1.05	1.38	3.06	1.69
Control	1.62	3.33	1.71	1.47	2.53	1.16	1.75	3.06	1.31
Positioning	4.54	4.71	0.17	4.47	4.63	0.16	4.38	4.75	0.38
Facial expression	3.21	3.88	0.67	3.29	3.42	0.13	3.00	3.56	0.56
Vocal appropriateness	3.88	4.38	0.50	3.68	4.16	0.47	3.75	4.31	0.56
Vocal expression	4.00	4.38	0.38	3.66	4.00	0.34	3.62	4.44	0.81
Pleasure with child	3.42	4.17	0.75	3.60	3.74	0.13	3.44	4.25	0.81
Displeasure with child	4.08	4.13	0.04	3.66	3.79	0.13	3.19	4.12	0.94
Appropriate materials	4.08	4.38	0.29	3.87	4.26	0.39	4.38	4.75	0.38
Adaptive behavior	4.04	4.29	0.25	3.79	4.00	0.21	3.62	4.12	0.50
Physical contact	4.46	4.25	-0.21	4.05	3.55	-0.50	3.56	3.62	0.06
Special activity	3.12	4.27	1.09	3.66	3.66	0.00	4.25	3.88	-0.38
Enjoyment of activity	2.17	3.77	1.64	3.24	3.60	0.26	3.38	3.62	0.25
Mother total	43.71	52.23	8.73	44.29	48.34	4.28	43.81	51.44	7.62
Facial expressiveness	3.00	3.58	0.58	3.18	3.51	0.27	3.06	3.81	0.75
Smiling	1.43	3.33	1.83	2.68	2.70	-0.03	2.12	3.06	0.94
Eye contact	3.33	4.04	0.71	3.92	3.65	-0.24	3.38	3.81	0.44
Vocalization	2.33	3.58	1.25	2.70	3.70	0.94	2.56	3.75	1.19
Activity level	3.54	4.38	0.83	3.42	4.11	0.65	4.12	4.44	0.31

change. The results of the difference score analysis indicated that the majority of dependent measures yielded positive changes over time. This suggests that the quality of the interaction sequence would appear to improve over time in a number of specific areas. Further analyses, in the form of t tests, were required in order to determine if the changes were significant. Before a discussion of the t test results further comment on the difference score analysis is required.

For the Down's Syndrome group, the only measure found to decrease in quality over time was Physical Contact (a maternal measure). This finding suggests that mothers of Down's Syndrome infants demonstrate difficulties in improving their ability to provide the appropriate amount of handling over time. Perusal of the mean scores for this group on this dependent measure at both times suggests that these mothers achieved high scores on this dependent measure at both times (mean at time 1 = 4.46, mean at time 2 = 4.25). These scores suggest that the Down's Syndrome mothers did not demonstrate positive change, however, they were able to provide the appropriate amount of handling at both times. Similar results for Physical Contact were found for mothers of the Neurological group (mean at time 1 = 4.05, mean at time 2 = 3.55), however they were not able to maintain their high score on this measure over time. This suggests that time in an early intervention program does not

produce positive changed in physical contact behaviour over time in the neurological group.

The following dependent measures also demonstrated no positive change over time in the neurological group: infant Smiling (mean at time 1 = 2.68, mean at time 2 = 2.70), and infant Eye contact (mean at time 1 = 3.92, mean at time 2 = 3.65). These findings suggest that the infants in the Neurological group do not demonstrate much smiling at either time. Time in early intervention does not appear to increase smiling in infants who are delayed due to neurological difficulties. The amount of eye contact in this group is consistent over time, with the children occasionally looking at the parent's face at both times.

The ability to choose a special activity did not demonstrate positive change over time in the Unknown group (mean at time 1 = 4.25, mean at time 2 = 3.88). This would suggest that with time, it became more difficult for the mothers to choose an activity that held the interest of the child. These results suggest that time in an early intervention program does not aid mothers of unknown etiology delayed infants in choosing an appropriate activity.

In order to determine if the positive difference scores from the previous analyses were in fact statistically significant differences t test analyses were performed. The first hypothesis predicted that positive changes will be

observed in mother-infant interaction over time for all diagnostic groups. This hypothesis was confirmed on a number of different dependent measures, each measuring a particular aspect of mother-infant interaction. Table 2 lists each of the dependent measures and the t-scores obtained for each diagnostic group utilizing a one-way test of significance. Blank spaces in the table indicate those areas where no positive changes were observed as indicated by the negative difference scores obtained in the previous analyses. Asterisks indicate which t-scores were statistically significant. Perusal of the data indicates that the Down's Syndrome group demonstrated positive change in more aspects of interaction (mother and child) than did either of the other two groups, as measured by this rating form. Mothers and the infants in the Down's Syndrome group appear to benefit from early intervention in more areas than do the other two groups.

The results of the *t* test analyses will be discussed with reference to each dependent measure:

Turn taking: All three diagnostic groups demonstrated significant positive changes over time. Scores from the t-test analyses are as follows: Down's Syndrome $t=7.95$, $p<.01$, Neurological $t=5.96$, $p<.01$, and Unknown $t=7.13$, $p<.01$. These results suggest that time in an early intervention

Table 2

t Scores Indicating Positive Change Over Time For Each Diagnostic Group

Dependent Measure	Down's	Neurological	Unknown
Turn taking	7.95**	5.96**	7.13**
Control	6.60**	4.71**	3.75*
Positioning	0.94	1.14	1.69
Facial expression	2.80*	0.66	1.65
Vocal appropriateness	2.77*	2.58*	1.59
Vocal expression	1.62	1.84	3.31*
Pleasure with child	2.64*	0.67	2.66*
Displeasure with child	0.17	0.60	3.17*
Appropriate materials	1.13	1.99	2.09
Adaptive behaviour	0.92	1.00	3.16*
Physical contact			0.24
Special Activity	2.94*		
Enjoyment of activity	6.11**	1.22	0.67
Mother total score	4.37**	2.67*	4.13**
Facial expressiveness	2.12	0.15	2.54
Smiling	6.10**		3.03*
Eye contact	2.21		1.16
Vocalization	3.91**	3.58**	2.64*
Activity level	3.05*	3.33*	1.58

* significant to the .01 level
** significant to the .001 level

program aids all three groups in their ability to take turns initiating activities. At time 1 only one of the dyadic members initiated most activities, but at time 2 the members of each diagnostic group learned to take turns initiating activities.

Control: All three diagnostic groups demonstrated significant improvement over time. t scores are as follows: Down's Syndrome $t=6.60$, $p<.01$, Neurological $t=4.71$, $p<.01$, and Unknown $t=3.75$, $p<.01$. This suggests that over time, all three groups learned to take turns choosing and directing activities. At time 1, only one member controlled the play session. At time 2, both members of the dyad controlled the play session.

Positioning: No significant changes in positioning ability were observed over time. Mean scores on this dependent measure at time 1 and time 2 respectively were as follows: Down's Syndrome 4.54 and 4.71, Neurological 4.47 and 4.63, Unknown 4.38 and 4.75. These mean scores for all three groups suggest that at both times each of the mothers were able to position their children in order to allow for ease of manipulation of play materials and face to face interaction. The lack of improvement may be due to a ceiling effect (i.e. had the scale accounted for higher scores positive changes may have been observed).

Facial expression: Only the Down's Syndrome group demonstrated positive change in this dependent measure over

time (t=2.80, p<.01). This suggests that the facial expression of these mothers became more animated with time. The Neurological and Unknown groups obtained the following mean scores on this dependent measure at time 1 and at time 2 respectively: 3.29 and 3.42 for the Neurological group, and 3.00 and 3.56 for the Unknown group. These results suggest that the mothers in the Neurological and Unknown groups exhibited moderately animated expressions part of the time in the interaction sequences on both occasions. Time in an early intervention setting did not appear to increase the amount of facial animation in these two groups.

Vocal appropriateness: Both the Down's Syndrome and the Neurological groups demonstrated positive change in this measure over time. t scores are as follows: Down's Syndrome t=2.77, p<.01, and Neurological t=2.58, p<.01. The mothers in these two groups learned to make their voice and language more appropriate to their child's developmental level over time. The Unknown group obtained means on this dependent measure for time 1 and time 2 respectively of 3.75 and 4.31. This suggests that the mothers in this group may have demonstrated the appropriate tone but not the appropriate pace or vice versa. Their use of developmentally appropriate language did not change positively over time.

Vocal expression: Only the Unknown group demonstrated positive change in this dependent measure over time (t=3.31, p<.01), suggesting that with time the voice of these mothers

became more expressive. Their speech was more rhythmic, frequent and it contained more variation in pitch. The Down's Syndrome group obtained means on this measure of 4.00 and 4.38 at time 1 and time 2, and similarly 3.66 and 4.00 for the Neurological group. These scores suggest that these two groups demonstrated moderate variability in expression and occasional speaking at both times. Time in an early intervention program did not appear to increase the amount of vocal animation in either of these two groups.

Pleasure with child: Both the Down's Syndrome and the Unknown groups demonstrated positive change in this dependent measure over time. t scores are as follows: Down's Syndrome $t=2.64$, $p<.01$, and Unknown $t=2.66$, $p<.01$. These results suggest that the mothers in these two groups increased the amount of praise they bestowed upon their child over time. The means for the Neurological group on this measure at time 1 and time 2 are 3.60 and 3.74, suggesting that at both times the mothers in this group occasionally expressed joy and laughter and/or gave more praise to their children. Time in an early intervention program did not produce any positive change in this measure for the Neurological group.

Displeasure with child: Only the mothers in the Unknown group demonstrated positive change on this measure over time ($t=3.17$, $p<.01$), suggesting that over time these mothers became less critical and demonstrated fewer negative

reactions to their child. The means for the other two groups on this measure for time 1 and time 2 respectively are as follows: Down's Syndrome 4.08 and 4.12, and Neurological 3.66 and 3.79. These results suggest that the Down's Syndrome mothers demonstrated almost no negative reactions to their child, and the Neurological mothers demonstrated very few negative reactions to their child.

Use of developmentally appropriate materials: None of the groups demonstrated positive change in their ability to choose materials that were appropriate to the developmental level of their child. The means for the three groups on this measure for time 1 and time 2 respectively are as follows: Down's Syndrome 4.08 and 4.38, Neurological 3.87 and 4.26, and Unknown 4.38 and 4.75. These findings suggest that the mothers of these children were able to choose appropriate materials for their children without the aid of early intervention.

Adaptive behaviour: Only the mothers of the Unknown group demonstrated positive change in this measure over time (t=3.16, p<.01), suggesting that over time these mothers became better at adapting their own behaviour to the cues provided by their child. The means for the other two groups on this measure for time 1 and time 2 are as follows: Down's Syndrome 4.04 and 4.29, and Neurological 3.79 and 4.00. These findings suggest that, at both times, these two groups were not always able to read their child's cues.

Physical contact: None of the groups demonstrated positive change in the skills required to provide the appropriate amount of handling to their child. The means for the three groups on this measure for time 1 and time 2 respectively are as follows: Down's Syndrome 4.46 and 4.25, Neurological 4.05 and 3.55, and Unknown 3.56 and 3.62. These findings suggest that at both times, the Down's Syndrome mothers were able to provide the appropriate degree of physical contact or non-functional touching to their children. The Unknown group, at both times, held or touched their child occasionally. Finally, the Neurological group demonstrated a slight decrease in the amount of touching or holding of their child over time.

Choice of special activity: Only the Down's Syndrome group demonstrated positive change in this dependent measure over time ($t=2.94$, $p<.01$), suggesting that with time the mothers in this group were better able to choose an activity which was enjoyed by both the parent and the child. The means for the other two groups are as follows: Neurological 3.66 and 3.66, and Unknown 4.25 and 3.88. These results suggest that the Neurological group, at both times, had a difficult time choosing the activity at first, but eventually succeeded in finding something that interested the child. The Unknown group was better at choosing an appropriate activity at time 1, and their ability to choose became more difficult with time.

Enjoyment of special activity: As with the choice of a special activity, the Down's Syndrome group was the only group to demonstrate positive change on this particular dependent measure (t=6.11, p<.01). This suggests that the child demonstrated a great deal more pleasure with the activity chosen by the mother at time 2; at time 1 the child did not appear to enjoy the activity. The means for the other two groups are as follows: Neurological 3.24 and 3.60, and Unknown 3.38 and 3.63. These results suggest that at both times the children in these two groups demonstrated some enjoyment of the activities presented by the mother.

Mother total score: All three groups demonstrated positive change in this composite score. T scores for the three groups are as follows: Down's Syndrome t=4.37, p<.01, Neurological t=2.67, p<.01, and Unknown t=4.13, p<.01. These results indicate that there was an increase in what appear to be positive interactive behaviours.

Facial expressiveness: None of the three groups of infants were found to demonstrate positive change in this measure over time. The means of the three groups on this measure at time 1 and time 2 respectively are as follows: Down's Syndrome 3.00 and 3.58, Neurological 3.18 and 3.51, and Unknown 3.06 and 3.81. These results suggest that the infants in all three groups demonstrated moderately animated facial expressiveness on both occasions.

Smiling: Both the Down's Syndrome (t=6.10, p<.01) and

the Unknown (t=3.03, p<.01) groups demonstrated positive change in this measure over time. These results suggest that with time the children in these groups smiled more frequently at their parents. The mean scores for the Neurological group on this measure at time 1 and time 2 respectively are as follows: 2.68 and 2.70. These scores suggest that these children rarely smiled at their parents at either time.

Maintaining eye contact: None of the three groups demonstrated positive change in this measure. The means for the three groups at time 1 and time 2 respectively are as follows: Down's Syndrome 3.33 and 4.04, Neurological 3.92 and 3.65, and Unknown 3.38 and 3.81. These results suggest that the children in all three groups occasionally directed their gaze to their parents' faces at both times.

Degree of vocalization: All three groups demonstrated positive change in this dependent measure over time. t scores are as follows: Down's syndrome t=3.91, p<.01, Neurological t=3.58, p<.01, and Unknown t=2.64, p<.01. These results suggest that with time all of the infants increased the amount of vocalization and made more sounds that were developmentally appropriate.

Activity level of the child: Both the Down's Syndrome (t=3.05, p<.01) and the Neurological (t=3.33, p<.01) infants demonstrated positive changes in this dependent measure over time. These results suggest that the infants in these two

groups became more physically active over time. The means for the Unknown groups on this measure at time 1 and time 2 respectively are 4.12 and 4.44, which suggests that these children were highly active at both times. For a summarized view of the pattern of results for each variable over time see Table 3.

The planned comparisons were then calculated. In these analyses the Down's Syndrome group was contrasted with both the Neurological group and the Unknown group combined. F scores can be found in Table 4. Asterisks indicate significant differences between groups. It was hypothesized that the Down's Syndrome group would demonstrate higher scores than either of the other two groups on each dependent measure at time 1 and time 2. This hypothesis was confirmed for the Displeasure with child dependent measure at time 1 only. At time 1 the mothers in the Down's Syndrome group were less critical of their children than the other 2 groups of mothers. At time 2 the difference between groups was no longer apparent.

Significant results were also found for the following dependent measures at time 1 only: Choice of a special activity ($F=7.75$, $p<.01$), Enjoyment of the special activity ($F=20.07$, $p<.01$), and Smiling ($F=11.57$, $p<.01$). However, the means suggest that these results were contrary to what was expected. For these dependent measures the Neurological group combined with the Unknown group obtained higher scores

Table 3
Patterns of Scores on Dependent Measures at Time 1 and Time 2 For Each Diagnostic Group

Score Pattern	Dependent Measure		
	Down's	Neurological	Unknown
Variables that increased significantly from time 1 to time 2	Turn taking Control Facial expression Vocal appropriate Pleasure Special activity Enjoyment Mother total score Smiling Vocalization Activity level	Turn taking Control Vocal appropriate Mother total score Vocalization Activity level	Turn taking Control Vocal expression Pleasure Displeasure Adaptive behavior Mother total score Smiling Vocalization
Variables that decreased from time 1 to time 2	Physical contact	Physical contact Smiling Eye Contact	Special activity
Variables where subjects scored high at both time 1 and time 2	Positioning Displeasure Use of materials Adaptive behavior	Positioning Use of materials Adaptive behavior	Positioning Use of materials Activity level
Variables where subjects scored midrange at time 1 and time 2	Vocal expression Facial expressive Eye contact	Facial expression Vocal expression Pleasure Displeasure Choice of activity Enjoyment Facial expressive	Facial expression Vocal appropriate Physical contact Enjoyment Facial expressive Eye contact

Table 4

F Scores for Planned Comparisons Contrasting Down's Syndrome with Neurological and Unknown at Time 1 and Time 2

Dependent Measure	Time 1	Time 2
Turn taking	3.68	0.18
Control	0.58	0.81
Positioning	0.37	0.02
Facial expression	0.05	1.96
Vocal appropriateness	0.54	0.34
Vocal expression	1.64	0.39
Pleasure with child	0.13	0.43
Displeasure with child	9.35*	0.47
Appropriate materials	0.03	0.48
Adaptive behaviour	2.02	0.73
Physical contact	5.19	4.95
Choice of Special Activity	7.75*	3.56
Enjoyment of Activity	20.07**	0.47
Mother total score	0.04	1.27
Facial expressiveness	0.22	0.11
Smiling	11.57*	1.99
Eye contact	1.39	1.27
Vocalization	0.88	0.20
Activity level	0.94	0.18

* significant to .01 level
** significant to .0001 level

than the Down's Syndrome group.

All other planned comparisons on the other dependent measures yielded non-significant results, although the means of a number of measures indicated the expected trend. These results suggested that the Down's Syndrome group did not differ significantly from the other two groups on these measures.

The next analysis to be performed was a principal components analysis. This was completed in an attempt to reduce the number of variables to a smaller number of components (factors). The analysis was performed on the variables at time 1. A minimum eigenvalue criteria of 1.00 was chosen in order to yield only the most reliable factors. With this criteria, in addition to the scree test performed, the analysis yielded 5 factors. The computer program was rerun specifying that 6 factors should be retained. This method of extracting an additional factor was suggested by Gorsuch (1974, p.131) in his text. Gorsuch suggests that the extraction of this extra factor yields a more reliable and interpretable factor solution. The six factors taken together account for 68.56% of the total variance. Table 5 lists the variables that contribute significantly to each factor. The factors, as well as the variables contributing to them, are listed in order of significance.

Table 5

Variables Contributing to Factors Derived from Principal Components Analysis

Factor Number	Variables	Factor Name
Factor 1	Vocal expression Facial expression Pleasure with child Vocal appropriateness Positioning	Maternal Responsiveness
Factor 2	Enjoyment of activity Choice of activity Smiling Eye Contact	Child Responsiveness to Special Activity
Factor 3	Turn taking Control Physical Contact *	Bipolar
Factor 4	Vocalization Facial expressiveness Activity level	Expressiveness of Child
Factor 5	Adaptive behaviour Use of appropriate materials	Sensitivity to Child's Needs
Factor 6	Displeasure with child	Displeasure with Child

* denotes a negative correlation

The *t* tests discussed earlier were re-run substituting the factors derived from the principal components analysis for the variables on the video rating form. As these analyses were exploratory in nature the two-way *t* test procedure for correlated groups was utilized. Also, a .05 level of significance was chosen, again due to the exploratory nature of these analyses. The results will be discussed according to each factor.

Factor 1: None of the three diagnostic groups demonstrated any improvement in maternal responsiveness over time. A review of the results from the previous *t* test analyses will indicate that some aspects of maternal responsiveness did demonstrate improvement.

Factor 2: The Down's Syndrome group demonstrated positive change over time in terms of child responsiveness to the special activity ($t=2.27$, $p<.05$). The Neurological group demonstrated a decrease (negative change) over time in child responsiveness to the special activity ($t=-2.64$, $p=.01$).

Factor 3: Only the Down's Syndrome group demonstrated positive change in the bipolar factor over time ($t=2.19$, $p<.05$).

Factor 4: None of the groups demonstrated any significant positive change in physical expressiveness of the child over time.

Factor 5: None of the groups demonstrated any

significant positive change in sensitivity to the child's needs over time.

Factor 6: None of the groups demonstrated any significant positive change in displeasure with child over time.

The mean standard scores for each diagnostic group on each of the factors at time 1 and time 2 was calculated. Table 6 lists these values.

The previous program was re-run without considering diagnosis as a contributing variable in order to see if improvement in the factors would be observed if all three groups were combined. None of the factors yielded significant results. See Table 7 for a listing of t values for each factor.

The planned comparisons reported previously were then re-run substituting the derived factors for the variables from the rating form. In these analyses the Down's Syndrome group was again contrasted with the Neurological and Unknown groups combined. F scores obtained from this analysis at time 1 and time 2 are listed in Table 8.

Results from the planned comparisons analyses were similar to the previous reported comparisons. On none of the factors did the Down's Syndrome group appear to demonstrate significantly higher scores than the Neurological and Unknown groups (at time 1 or time 2). This suggests that the Down's Syndrome group does not function

Table 6

Mean Standard Scores for Each Diagnostic Group on Each of the Factors Derived From the Principal Components Analysis at Time 1 and Time 2 Respectively

Factor Number and Name	Down's	Neuro	Unknown
1 Maternal Responsiveness	0.12	0.01	-0.21
	0.17	-0.18	0.13
2 Child Responsiveness	-0.60	0.31	0.16
to Special Activity	0.26	-0.16	-0.02
3 Bipolar	-0.28	0.04	0.30
	0.10	-0.04	0.13
4 Expressiveness of	-0.03	-0.04	0.14
Child	0.12	0.04	0.14
5 Sensitivity to	0.10	-0.18	0.26
Child's Needs	0.04	-0.13	0.22
6 Displeasure with child	0.35	-0.02	-0.46
	0.32	-0.22	0.00

Table 7

t Scores Indicating Change Over Time in the Factor Scores Without Considering Diagnosis

Factor Number and Name		t	p
1	Maternal Responsiveness	0.13	0.89
2	Child Responsiveness to Special Activity	-0.52	0.60
3	Bipolar	0.20	0.84
4	Expressiveness of Child	0.31	0.76
5	Sensitivity to Child's Needs	0.12	0.91
6	Displeasure with Child	0.48	0.64

Table 8

F Scores for Planned Comparisons Contrasting Down's Syndrome with Neurological and Unknown at Time 1 and Time 2: Utilizing Derived Factor Scores

Factor Number and Name	Time 1	Time 2
1 Maternal Responsiveness	0.74	0.63
2 Child Responsiveness to Special Activity	12.31*	2.07
3 Bipolar	3.21	0.03
4 Expressiveness of Child	0.09	0.02
5 Sensitivity to Child's Needs	0.05	0.00
6 Displeasure with Child	5.65	2.69

* Significant to .001 level

any differently than the other two groups on aspects of interaction measured by these factors. However, on factors 1 and 6 at time 1 and 2, and on factor 2 at time 2, the appropriate trend was observed in the means. In other words, the mean scores for the Down's Syndrome group was higher than the other two groups at these times. This trend, however, was non-significant.

One of the planned comparisons was found to be significant in the opposite direction than expected. The Neurological and Unknown groups were found to score significantly higher than the Down's Syndrome group on factor 2 (Child Responsiveness to Special Activity) at time 1 only. This suggests that before intervention began, the Neurological and Unknown infants responded better to the special activity introduced by their mothers than did the Down's Syndrome group.

One last post hoc analysis of the data was performed. Due to the large number of diagnoses exhibited by the infants in the Neurological group, speculation rose as to the influence of particular diagnoses on outcome. It was decided to evaluate these effects post hoc. Although the particular type of problems exhibited were extremely varied, the following categories (in no particular order) represent areas of impairment that were most often represented: prematurity, cerebral palsy, genetic disorders, hydrocephalus, seizure activity, physical deformity, lung

and/or breathing problems, muscle and/or motor skill involvement, cytomegalovirus (CMV), gastrointestinal and/or feeding difficulties, brain haemorrhaging, and cardiac problems.

The subjects in the Neurological group were then divided into two groups: those dyads who demonstrated positive change in 10 (approximately half) or more of the variables measured (n=16), and those dyads who denonstrated positive change in less than 10 of the variables measured (n=22). The number of infants in each group exhibiting each of the above-named disorders was then tallied. Before statistical analysis was performed the following four difficulties appeared to be unequally represented between the two groups: hydrocephalus, muscle and/or motor skill involvement, gastrointestinal and/or feeding difficulties, and cardiac problems. The first three of these four were unequally represented in the group of dyads who demonstrated positive change in half or more of the variables measured. For hydrocephalus the representation in the groups was 31% of the group who showed more positive change, and 9% of the group who showed less positive change, for muscles and/or motor skills the numbers were 25% and 4% respectively, and for gastrointestinal and/or feeding the numbers were 19% and 0% respectively. These three types of disorders are therefore associated with much positive change in mother-infant interaction.

Cardiac difficulties was the only diagnosis that was associated with a lesser degree of positive change. These dyads did not demonstrate as much improvement as the other group of neurologically impaired infants. Six percent of the group that demonstrated positive change in more than half of the variables, and 27% of the group demonstrating positive change on less than half of the variables, exhibited some type of cardiac abnormality. It would appear that cardiac complications are associated with a lesser degree of positive change in mother-infant interaction.

Chi Square analyses were performed in order to determine if these particular medical difficulties significantly contributed to the classification of these dyads into one of the two above mentioned groups. Only one of the four medical categories mentioned above appeared to be unequally represented (to a statistically significant degree) between the two groups of neurologically impaired infants. Those children who exhibited difficulty with feeding or gastrointestinal problems had a better chance of being members of the group of dyads who exhibited positive change in more than half of the variables under consideration ($X^2=4.49$, $p<.05$). Hydrocephalus, muscle and motor skill involvement, and cardiac difficulties were not influential from a statistical standpoint.

CHAPTER IV

DISCUSSION

The findings resulting from this study suggest that mother-infant dyads exhibit positive changes in aspects of mother-infant interaction when participating in an early intervention program, and that different patterns of change are observed depending upon the diagnostic group the child represents. It is important to note the use of the term **"positive change"**. This term was chosen so as to avoid using terminology that may imply a value judgement. If the term "improvement" were used to denote the changes in interaction then it would imply that one is certain that these changes in behaviour are actually becoming more optimal. This has yet to be determined. It would appear that the only way to determine if the positive change in mother-infant interaction is indeed "improvement" would be to continue the study longitudinally and assess future outcomes of the mother-child relationship. Do the mother and child benefit from having "improved" in terms of their interaction with one another?

Other researchers vary in their use of value judgements of their findings. Mahoney and Powell (1988) speak of "significant changes in parents' implementation of [intervention] strategies" (p.87). They speak of parents who were high in the implementation of these strategies and parents who were low. None of these descriptions implies a

value judgement. On the other hand, Rosenberg and Robinson (1985), and Resnick and his colleagues (1988) do use terminology that would imply value judgements of their outcomes. For instance, these authors each speak of **enhancing the quality** of interactions.

Future research must undertake this question of whether or not positive changes in the measures used really do indicate "improvement" in interaction. If "improved" children do better than "unimproved" children later in life, then perhaps it is appropriate to label the positive change as actual "improvement".

The results of the difference score analysis indicate that very few of the maternal and child variables measured yielded a decrease in scores. Although one would hope that none of the variables would yield negative change, this small number of negative values indicates that the three groups of infants benefit primarily from their early intervention experience in terms of mother-infant interaction. It should be noted that the negative differences are all less than one rating scale point, indicating that the mothers and infants did not exhibit drastic declines in these behaviors.

The maternal variables yielding negative change were Physical Contact for both the Down's and Neurological groups and Choice of a Special Activity for the Unknown group. The infant variables yielding negative change were Smiling and

Eye Contact for the Neurological group only. The only variable of these mentioned that yielded high scores at both times (despite the decrease) was Physical Contact for the Down's group. This suggests that this area needs no further attention in early intervention for this group of infants. On the other hand, the decrease in the other variables mentioned suggests that intervenors working with Neurologically impaired children need to place further emphasis on training mothers to provide the appropriate amount of physical handling to the infants. Mothers should also be provided with techniques which may aid them in eliciting smiles and eye contact from their children. For the Unknown group, intervenors should be placing more emphasis on teaching the mothers to choose an activity appropriate for their child; mothers need to be provided with a number of activities in which they can involve their children.

The results of the t test analyses confirmed the first hypothesis. It was hypothesized that positive changes would be observed in mother-infant interaction over time for all diagnostic groups. This, indeed, was the case. These findings are in concordance with those of Mahoney and Powell (1988), Resnick, Armstrong and Carter (1988) and Rosenberg and Robinson (1985). Each of these studies also yielded improvement in mother-infant interaction resulting from involvement in early intervention. The Down's group

improved in the following areas: Turn Taking, Control, Facial Expression, Vocal Appropriateness, Pleasure with Child, Choice of a Special Activity, Enjoyment of a Special Activity, Mother Total Score, Smiling, Vocalization, and Activity level. The Neurological group improved in these areas: Turn Taking, Control, Vocal Appropriateness, Mother Total Score, Vocalization, and Activity Level. Finally, the Unknown group improved in the following areas: Turn Taking, Control, Vocal Expression, Pleasure with Child, Displeasure with Child, Adaptive Behaviour, Mother Total Score, Smiling, and Vocalization.

Interesting to note is that the only four areas that yielded improvement in all three groups were Turn Taking, Control, Mother Total Score, and infant Vocalization. One would expect improvement in infant vocalization simply due to increasing age; however, the other results would appear to be directly related to the training that the mothers received. Since the early intervention programs were individualized to each child's needs, these findings suggest that regardless of the type of training received, the mothers are able to become better at taking turns with their child and sharing control of activities more with their child. Results also suggest that regardless of the type of intervention, they will demonstrate an overall positive change in their behaviours directed toward their child. These results are encouraging, since they suggest that

mothers can expect to improve in these areas regardless of the intervention techniques, and regardless of the diagnosis of their child. This, again, is consistent with the studies of Rosenberg and Robinson (1985), Mahoney and Powell (1988), and Resnick and his colleagues (1988), because each of these involved different types of training programs for the mothers, and different subject populations. Resnick and his colleagues (1988) studied premature infants, whereas Rosenberg and Robinson (1985) and Mahoney and Powell (1988) utilized a subject population of varying handicapping conditions.

In addition to the four areas mentioned above that demonstrated significant positive change consistently in all three groups, the pattern of results for the other variables under consideration differed between diagnostic groups. For example, the Down's group improved in maternal Facial Expression, whereas the other two groups did not. These findings stress the importance of recognizing the heterogeneity that exists in the population of delayed infants. All infants do not react in the same way to training. Infants of a certain diagnosis may improve with a particular type of training whereas infants of another diagnostic group may not improve. These findings are consistent with those of Landry and her colleagues (1984) who recognized the heterogeneity which exists in very low birthweight infants. Landry and her colleagues (1984) noted

that medical complications at birth had a direct effect on later outcome. It is important that future research take into consideration the differences that exist between members of the disabled or delayed population. Kysela and Marfo (1983) also noted that it is a mistake to assume homogeneity in the delayed population. They stated that there are "differences among retarded children and nonretarded children, as well as among their mothers, which lead to unique interaction styles among dyads." (p.205).

The implications of these findings are that early intervention should target specific behaviours depending upon the diagnosis of the child. In order to understand which of the behaviours in this study need further emphasis in training it was important to consider the scores obtained by each group on each measure. Just because a group may not have demonstrated improvement in one area does not suggest that group did not perform well. If the means were high at both times (before and 1 year after intervention) then that particular area was not necessary to emphasize in treatment (i.e., the dyad performed well even before intervention). Table 3 provides a simplified synopsis of the results pertaining to this discussion.

In some aspects of interaction, dyads scored high on the rating scale at both time 1 and time 2. There are two explanations for this result. The first is that dyads who scored high in these areas do not need to receive training

in early intervention that focuses on these areas. Two areas where all three groups scored high both before and after intervention were Positioning and Use of Developmentally Appropriate Materials. This suggests that the mothers in each of the three groups did not need to be trained in how to position their infant for easier face-to-face contact. They also did not need to be advised on developmentally appropriate toys to use with their child. This suggests that intervenors need not emphasize these issues in intervention with these three groups of infants unless they become apparent as issues for a particular mother-infant dyad. The other variables yielding high scores on the measure at both times were varied between diagnostic group. This suggests that behaviors that may need to be addressed in treatment for one group may not necessarily be the same as those needing attention for another group.

The second explanation for this group of high scores is that the findings may suggest a failure in the rating scale itself to measure adequately these variables yielding high scores at both times. Subjects may have demonstrated improvement in these areas but the measure may not have been adequate in allowing one to recognize that a difference existed. If this were the case, then these particular aspects of interaction would be subject to what is known as the "ceiling effect". Anastasi (1988) discusses this

situation where "the scores [are] piled at the upper end [of the distribution]... a finding that suggests insufficient test ceiling." (p.208). If the ceiling on these scales were raised, then improvement in these areas may have been observed. As it is now, a high score on these measures is difficult to interpret because it may not represent the true quality of interaction. A score of 5 on the measure at time 1 may not mean the same thing as a score of 5 on the measure at time 2. Improvement may have occurred, but the improvement is not reflected in the scores. Future use of this measure should explore this potential confound.

There were no areas of interaction where dyads scored low at both times, aside from Smiling in the Neurological group which yielded a decrease and was discussed above. This would suggest that in all areas of mother-infant interaction, the dyads in this study were not subject to any floor effects. If a floor effect were present then there would be "a piling of scores at the low end, suggest[ing] that the test has too high a floor for the group under consideration, lacking a sufficient number of easy items to discriminate properly at the lower end of the range." (Anastasi, 1988, p. 207). In other words, the measure allows for sufficient discrimination between subjects at the low end of the rating scale. Thus for these groups, the meaning of a score of 1 is unequivocal.

These findings suggest that future research regarding

this measure should consider the possibility that a ceiling effect may exist. The scales need to reflect the potential variability between subjects scoring at the higher end of the scale. In this study, more improvement may have been observed had the measure more adequately represented dyads who scored high at both times.

The other pattern of scores that was observed in the t test results was dyads that had a tendency to score within the mid-range at time 1 and time 2. Scores of this magnitude suggest that the dyads exhibit appropriate behaviour only part of the time, on both occasions. The lack of improvement in these scores and the fact that no ceiling effect can account for the lack of improvement suggests one of two things. Firstly, that intervenors working with these dyads need to focus more on training mothers to perform these behaviours, or elicit these behaviours from their infants. Secondly, that early intervention, in this form, fails to improve these behaviors.

The pattern of variables (with scores in the midrange) was different for each diagnostic group. Again, this suggests that it is important to recognize the heterogeneity in the delayed population. The Down's group needs more emphasis in intervention in training of Vocal Expression, infant Facial expressiveness and infant Eye Contact. The Neurological group needs more emphasis on Facial Expression,

Vocal Expression, Pleasure with Child, Displeasure with Child, Choice of Special Activity, Enjoyment of Special Activity, and infant Facial Expressiveness. Finally, the Unknown group needs more emphasis in intervention placed on Facial Expression, Vocal Appropriateness, Physical Contact, Enjoyment of Special Activity, infant Facial Expressiveness, and infant Eye Contact. Facial Expressiveness of the child appears to be an area of concern for all three groups. The Neurological group requires assistance in more areas of interaction than the other two groups.

It is difficult to explain why certain areas may yield improvement in one group and not in another. Perhaps it is the specific medical complications that contribute to the dyad's success or failure in mastering a certain interactive behaviour, as was the case for Landry and her colleagues (1984). Future research should explore this possibility. Until it is known why one group improves in one area and another does not, all we can do is help intervenors know what areas may be more difficult for one group than another group to master. This information is helpful in the design of early interventions for the three groups of delayed infants in this study.

The second hypothesis to be proposed in this study was as follows: the Down's Syndrome group will demonstrate higher ratings on the outcome measure of mother-infant interaction at both times as compared to both the

Neurological group and the Unknown group. This hypothesis was, on the whole, not confirmed. In only one aspect of mother-infant interaction was the hypothesis supported: Displeasure with Child. At time 1, the mothers in the Down's group were less critical of their children than were the other 2 groups of mothers. At time 2 the difference between groups was no longer apparent. Perhaps the Down's mothers were less critical because their expectations for their children were not as high as those of other mothers. Lojkasek and his colleagues (1990) pointed out that "the family history relating to identifying, diagnosing, and responding to children's delayed development differs for delays of differing etiologies." (p.262). Down's Syndrome is usually diagnosed early in the child's life so the mothers have more time to adjust and seek support. Perhaps they are more comfortable with their children and, therefore, exhibit less displeasure than do the mothers of other infants who receive diagnoses later on. However, this explanation may not account for why the Down's group differed in this aspect of interaction and not in others.

The fact that the Down's group attained higher scores on this particular variable at time 1 and not at time 2 argues for the effectiveness of early intervention for children with many types of delay. The result suggests that the quality of interaction is equivalent among the three groups after one year in an early intervention program.

Although Down's children may have had an advantage on this particular aspect of interaction originally, it would appear that one year in an early intervention program eliminates the differences between groups.

The fact that some of the planned comparisons yielded results suggesting that the Neurological and Unknown groups received higher scores on the rating scale than did the Down's group would seem to provide further proof that the pattern of results on the various aspects of interaction differs between diagnostic group. In some aspects of interaction, the Down's group received higher scores and, in other aspects, the Neurological and Unknown groups received higher scores. Although the hypothesis was not confirmed, this analysis yields important information: i.e., heterogeneity exists between the different types of delayed infants.

The lack of significant results is in concordance with the results of Lojkasek and his colleagues (1990) who found no differences in maternal responsiveness resulting from diagnostic group. Instead, the contributing factors to outcome in that study were maternal, paternal, and child predictors. These predictors were as follows: maternal age, paternal age, child responsiveness, and mother's rating of support from her family. Perhaps in this study, the failure of the Down's group to score higher than the other two groups had more to do with these variables than with

diagnosis itself. Although the results of the *t* test analyses indicate the importance of considering diagnosis due to the different pattern of results, diagnosis does not appear to predict "better" scores, just "different". Future research in this area should study whether diagnostic group differences influence the **pattern** of results, and should also study whether maternal, paternal and child variables contribute to the **quality** of those different outcomes.

The Principal Components Analysis yielded six factors, each of which represent a particular aspect of mother-infant interaction. The factors and the variables contributing to them are listed in Table 5. It should be noted that the analysis was purely exploratory. No hypotheses were put forth as to the expected outcome, as would have been the case if it were a confirmatory factor analysis. Exploratory principal components analysis allows one "to describe and summarize data by grouping together variables that are correlated. The variables themselves may or may not have been chosen with potential underlying processes in mind." (Tabachnick & Fidell, 1989, p.599). Once completed, the factors derived from this type of analysis may help with future hypothesis generation (Tabachnick & Fidell, 1989).

With this in mind, it was encouraging to find that the first factor derived from this analysis was in concordance with an aspect of mother-infant interaction discussed in a previous study. The five variables found to contribute to

Factor 1 are exactly the same as those contributing to a factor called Maternal Responsiveness in a study by Lojkasek and his colleagues (1990). This factor was given the same name in the present study. Lojkasek and his colleagues (1990) used confirmatory factor analysis based on information from previous studies to derive their Maternal Responsiveness factor. In their study the factor was derived from data on mother-child interaction with children of preschool age. The fact that this factor was found in the present study, when the subjects were infants, suggests that this factor is relatively robust from infancy to preschool age. Future research should continue to study the presence of this factor as it contributes to mother-child interaction. Perhaps this factor would also be found in school-aged children.

Factor 2, called Child Responsiveness to Special Activity, is consistent with an aspect of mother-child interaction studied in previous research. Contributing to the present factor are the following variables: Enjoyment of Special Activity, Choice of Special Activity, Smiling and Eye Contact. Crawley and Spiker (1983) rated children in their study on Social Responsivity. Although this factor was not derived statistically, it is remarkably similar to the factor derived in the present study. Crawley and Spiker (1983) describe a responsive child as one who "eagerly and appropriately responds (e.g., through visual attention,

attempted compliance, or active compliance to most maternal initiations)." (p.1315). In the present study the responsive child responds to the activity initiated by the mother with smiling and eye contact. The fact that this factor has been found in previous research is encouraging, suggesting that this is an aspect of mother-infant interaction that should be subject to further study.

Another factor found in this analysis that is consistent with the results of past research is Factor 5, called Sensitivity to Child's Needs. Variables contributing to this factor were Adaptive Behaviour and Use of Developmentally Appropriate Materials. Crawley and Spiker (1983) rated maternal behaviour on a Sensitivity scale. Although, again, their scale was not derived through statistical means, their description of the behaviours contributing to their scale is remarkably similar to those in the present study. For instance, they describe this factor as the "degree to which mother's behaviour reflects awareness of child's cues or signals." (p.1315). Adaptive behaviour in this study is defined as the parent's ability to read the cues his/her infant gives and respond to meet the child's needs. Crawley and Spiker (1983) also note that a sensitive mother will initiate activities "in a way that shows awareness of child's current... developmental capabilities,"(p.1315). The second variable contributing to our Sensitivity factor is Use of Developmentally Appropriate

Materials, which also implies awareness of the infant's developmental capabilities.

The fourth factor, Expressiveness of Child, was influenced primarily by the following variables: Vocalization (infant), Facial Expressiveness (infant), and Activity Level (infant). Once again this factor is similar to an aspect of mother-infant interaction measured by Crawley and Spiker (1983). They stated that facial expression and body movements as contributed to a variable called Animation.

The fact that these four factors have support from previous research bodes well for the use of this particular measure of mother-infant interaction. Crawley and Spiker (1983) used a different measure of mother-child interaction, but the aspects under consideration are remarkably similar to the factors derived from the present measure.

The other two factors derived from this analysis were Displeasure with Child (factor 6) and the bipolar factor (factor 3). The sixth factor contributed the least amount of variance of all of the derived factors. It would appear that the Displeasure with Child variable measures an aspect of interaction not tapped by the other factors under consideration. The third bipolar factor is difficult to explain. Contributing to this factor were the following variables: Turn Taking, Control, and Physical Contact (which correlated negatively). If Turn Taking and Control alone

were contributors then this would be largely consistent with an aspect of mother-child interaction known as directiveness (Crawley & Spiker, 1983; Lojkasek et al., 1990). The fact that Physical Contact was negatively correlated to these variables does not make clinical sense. If a mother and infant are reciprocal in their turn taking and control over the activities in the interaction sequence, then it does not make sense that that same mother does not provide appropriate amounts of physical handling to her child. When one considers that the Physical Contact variable yielded no improvement in the t test analyses as well, it is possible that this particular scale should be re-evaluated. Perhaps the rating of this aspect of behaviour has been scaled inappropriately on this measure. This is something that future research should consider before utilizing this variable in another measure of mother-infant interaction.

The t test analyses were re-run using the factors as outcome variables. Very few significant results were found. The Down's group demonstrated positive change over time in Child Responsiveness and the Bipolar factor. The Neurological group demonstrated negative change over time in the Child Responsiveness factor. The fact that different results were found with different diagnostic groups again emphasizes the heterogeneity of the delayed population.

The fact that the factors themselves did not yield positive change when so many of the variables which

contributed to those same factors yielded positive change (as reported from the original t test analyses) is curious. One would have expected the factors to yield positive change when the variables contributing to them did so. An explanation for this finding may be found in the psychometric properties of the video scoring measure used in the present study as discussed above. It is possible that the ceiling effect, mentioned previously, affected enough of the variables so as to prevent the factors that they were loaded on, from yielding positive change. In other words, had the ceiling effect been absent, more of the variables may have yielded positive change, thereby allowing the factors that they were correlated with to reflect that change. Future research must attempt to eradicate the ceiling effects from the measure and then run these same analyses again in order to confirm these speculative conclusions.

The same explanation may account for the results of the t test analyses on the factors when the diagnostic group variable was removed. When all dyads were considered as one group, none of the factors yielded positive change. This may also be a function of the analysis. Individual changes within each diagnostic group may have been overlooked when all subjects were pooled together. Thus stressing once again, that it is important to consider that the delayed population is heterogeneous. If one does not recognize this

then important findings may be overlooked.

The Maternal Responsiveness factor did not yield positive change in this particular analysis. Since this factor appears to be reliably found in the interactions of dyads involving older preschool children (Lojkasek et al., 1990), it is possible that improvement in this area of interaction may be observed in this older age group. In other words, perhaps significant results were not found because of the young age of the children in this study. Future research should explore this possibility.

Planned comparisons were made between the Down's group and the Neurological and Unknown groups combined, with the outcome measure being the six factors derived from the Principal Components Analysis. The explanation for the lack of significant results from these planned comparisons is essentially the same as for the planned comparisons completed with the individual variables as outcome measures. The Down's group did not receive significantly higher scores than the other two groups on these factors because diagnosis does not account for differences in the quality of interaction. However, diagnosis does contribute to differing patterns of results found (as revealed by the original t test analyses). Once again, the fact that diagnostic group did not contribute to changes in Maternal Responsiveness (factor 1) is in concordance with the results of Lojkasek and his colleagues (1990).

The last post hoc analysis revealed that differing medical problems in the Neurological group appeared to contribute to successful outcome in terms of mother-infant interaction. Hydrocephalus, muscle and/or motor skill involvement, and gastrointestinal and/or feeding difficulties appeared to contribute to a good outcome (although only gastrointestinal and/or feeding difficulties yielded significant results). Children with these difficulties usually demonstrated positive change in more than half of the interaction variables under consideration. Hydrocephalus likely yields a good prognosis in terms of interaction because it rarely causes other problems early in the child's life if it is successfully shunted. The implications of hydrocephalus usually appear in late childhood before adolescence (Smith, 1991). Therefore, the children with hydrocephalus in this study likely were controlled medically for this condition. Feeding and motor difficulties may not have interfered with positive changes in interaction because mothers may have seen the problems as medically treatable, or at least non-life threatening.

The medical complication that did appear to interfere with the achievement of positive changes in interaction was cardiac complications. These are difficulties that the lay-person (meaning the mothers of the infants) would recognize as potentially life-threatening to their infants. It is possible that the mothers of these infants were more timid

about their infants in terms of physical handling and manipulation. They may not have wanted to over-exert their children for fear of putting too much stress on the damaged heart. These conclusions are purely speculative. More research on the implications of specific medical conditions on interaction is needed. It is encouraging, however, that the gastrointestinal results are in accordance with Landry and her colleagues (1984) who found different outcomes associated with early medical complications in the premature infants in their study.

The lack of influence of prematurity on the outcome in this study is more easily understood when one considers the study by Landry and her colleagues (1984). They subdivided premature infants according to medical diagnosis. Their results revealed that the outcome of premature infants is not dependent upon prematurity itself, but rather on the particular medical complications that are concordant with this condition. These findings are also consistent with those in the attachment literature. Goldberg and her colleagues (1986b) found that prematurity did not affect the pattern of attachment security found in the infants. However, when Plunkett and his colleagues (1986) included medical risk into consideration, differences in attachment patterns were found in the premature infants classified as high-risk. Therefore, the findings in the present study seem consistent: prematurity does not affect interaction,

but medical complications do affect changes in interaction.

These findings once again stress the fact that heterogeneity exists within the population of delayed infants. It would appear that the Neurological group in this study could have been subdivided further into specific medical categories. The implications of these findings are that constitutional characteristics of children may interfere with training in early intervention. The mothers may not demonstrate positive change in some aspects of interaction because the characteristics of their children interfere with the completion of some behaviors. Attachment research has noted that child characteristics (i.e., temperament) play a role in the formation of attachment (Sroufe, 1985; Goldsmith & Alansky, 1987). Since mother-infant interaction is closely associated with attachment, it is not surprising that child characteristics also affect the mother-child relationship.

There are two shortcomings of the present study. The first is the possibility that the measure of interaction was subject to a ceiling effect. Future research should attempt to raise the ceiling of these particular variables. These variables must allow for "better than optimal" behaviour. Secondly, a low number of subjects were used in the Principal Components Analysis. The analysis should utilize data from 100 to 200 subjects. This was impossible within the financial and time constraints of the current project.

CHAPTER V

SUMMARY AND CONCLUSIONS

The results of this project reiterate the importance of studying mother-infant interaction. The primary finding of this study would appear to be that mother-infant dyads involved in early intervention benefit in terms of positive changes in mother-infant interactional behaviour. Also of import is the finding that there are differences in the pattern of changes in interaction behaviours dependent upon medical diagnosis. In particular, infants who have Down's Syndrome, those who are Neurologically impaired, and those who are delayed due to Unknown etiology exhibit differences in their pattern of positive changes in interactional behaviours. It would appear that each group reacts differently to the stimulation they receive through involvement in an early intervention program.

Also of interest was the derivation of the Maternal Responsiveness factor and other factors that were consistent with previous research, as well as the finding that particular medical complications can impact on interaction success.

The current study has both theoretical and clinical implications. In terms of theory, the importance of considering the heterogeneity of the delayed population is stressed. Three diagnostic groups of delayed infants yielded three different patterns of results. Diagnostic

group appears to be an important factor to consider in designing future studies of delayed infants and their families. In terms of clinical relevance, results suggest implications for service delivery in early intervention programs. It would appear that each diagnostic group benefited from the program in different areas. Information about specific behaviours requiring improvement would aid intervenors in designing individualized and effective programs for their clients.

APPENDIX A

PROJECT DESCRIPTION LETTER TO PARENTS

555 UNIVERSITY AVENUE
TORONTO, ONTARIO
CANADA M5G 1X8
PHONE (416) 597-1500

THE HOSPITAL FOR SICK CHILDREN

Child Development Clinic
Developmental Evaluation Unit
Direct Dial (416) 598-6308

Department of Paediatrics
Division of Neurology

Dear _____

You are presently participating in the Durham Region Infant Development Program. In our years of working with children and families we have found that parents generally find this kind of program helpful for themselves and their child. They serve many different families, each with their own unique needs and characteristics. Some families have more supports and/or stresses in their lives than other families. Some children have more developmental needs than others. In order to better understand what aspects of the program are helpful to each family, we are asking parents who are receiving the program to participate in a research project. This project is being conducted as a joint effort with Dr. Sharon Marcovitch and Dr. Susan Goldberg from The Hospital for Sick Children and Elizabeth Thompson a Ph.D. Candidate at the Ontario Institute for Studies in Education.

In this project we will be looking at the child's development before he/she enters the program and after they have been in the program for some time. Some of the questions we will be looking at are: How do individual differences in the child's temperament and social behaviour make it easier or more difficult to participate in an infant development program? Does help from family, friends and professionals make it easier to participate in an infant program? What characteristics of the child and family make it easier or more difficult to participate in this kind of program?

We hope that by learning more about the families and children who participate in the program we will be able to provide the most beneficial services possible to the child and family.

Next time the infant teacher of the Durham Region Infant Development Program comes to visit she or he will be bringing another person along (Hospital for Sick Children research project staff) to gather some of the information we need for our

observations. This person will be asking some background information on you, your child and your family. She will also be asking you to fill out some questionnaires on your child's temperament and your feelings about raising a child who may have some delays in his/her development. As well, mothers and children will be asked to participate in a short videotaped play session. Arrangements can be made for you to view the videotape if you would like. The visit to gather all the information will take approximately 2 hours. Similiar sessions will take place six months after you have been in the program and one year after you enter the program. It is our experience that most parents find the session enjoyable and informative. We believe that you and your child will experience no risks or discomforts by participating in this research project.

The teacher can answer any questions you may have regarding the project and you may also talk directly to project staff. We would like you to understand that your participation in this research project is voluntary and it is not necessary to participate in order to receive the infant development program. Should you choose to withdraw from the research project at any time the quality of the infant development program for you and your child would not be affected. All information concerning you and your child will be kept confidential and no information will be released or printed that would disclose your personal identity without your permission. If you are able to participate in this research project we would ask you to sign a form which gives us permission to accompany the intervenor on their next visit.

We hope that you will be able to participate in the project and look forward to meeting with you.

Yours Sincerely,

Elizabeth Thompson M.A.
Project Coordinator

Contact Person:
Elizabeth Thompson
Ph.A - 598-6333

Sharon Marcovitch Ph.D C.Psych.
Co-Director Developmental Evaluation Unit

APPENDIX B

CONSENT FORM

555 UNIVERSITY AVENUE
TORONTO, ONTARIO
CANADA M5G 1X8
PHONE (416) 597-1500

Child Development Clinic
Developmental Evaluation Unit
Direct Dial (416) 598-6333

Department of Paediatrics,
Division of Neurology

Consent Form

Title of Research Project:	Early Intervention: Evaluation of Program, Parent and Child Predictors
Investigators:	Sharon Marcovitch, Ph.D., Susan Goldberg, Ph.D., Elizabeth Thompson M.A.

I acknowledge that the research procedures described on the attached form and of which I have a copy, have been explained to me and that any questions that I have asked have been answered to my satisfaction. I have been informed of the alternatives to participation to this study. I also understand the benefits (if any) of joining the research study. The possible risk and discomforts have been explained to me. I know that I may ask now, or in the future, any questions I have about the study or the research procedures. I have been assured that the records relating to me/my child and my/his/her care will be kept confidential and that no information will be released or printed that would disclose personal identity without my permission.

I understand that I am free to withdraw (my child) from the study at any time. I further understand that if the study is not joined, or if there is withdrawal from it at any time, the quality of medical care for me/my child and for other members of my family at The Hospital for Sick Children will not be affected.

The people who may be contacted about the research are:

Elizabeth Thompson, 598-6333
Sharon Marcovitch, 598-6333
Susan Goldberg, 598 -6365

Name _____

Signature_____

Date _____

Child's Name _____

APPENDIX C

VIDEO SCORING MEASURE

Parent-Child Interaction - Video Scoring

Child's Name _____

Subject # _____

Diagnosis _____ Sensory Handicap ? _____

Session: Initial ___ 6th month ___ One year ___

Video session with: Mother____ Father____

Scores: Parent ____

Rater _____

Date: _____

Circle the number which best describes the interaction you have just observed in the following areas:

I Turn-taking: who takes turns to initiate an activity, the parent or the child?

1 a) child initiates all activities — circle a or b

b) parent initiates all activities

a) child initiates most of the activities

2

b) parent initiates most of the activities

3 some turn-taking by parent and child - but either parent or child initiates the majority of the activities

4

5 turn-taking throughout - parent and child take turns initiating activities

II Control: degree to which the parent sets the stage for all new activities and sets up the manner in which materials are to be played with.

1 a) parent allows child total control of how and what to play with throughout the session (no more than one parental intervention in style or choice).

b) parent sets up all play activities and designs the way the child and parent will play with the toy. Parent interrupts play frequently to guide child or demonstrate(implies intrusive control).

2

3 Mother chooses play material but allows child to play with them in his or her own way. Child chooses materials then mother controls the manner in which materials are used.

4

5 Shared control - parent controls the play session approximately half the time and the child controls the play session the other half of the time.

III Positioning: degree to which parent positions self and child to take full advantage of toys and face to face interaction in play situation.

1 parent is frequently sitting so he/she cannot see the child's face and child is awkwardly positioned to enjoy the situation; parent not easily accessible to child.

2

3 parent is accessible to the child in good position but child is awkwardly placed or vice versa

4

5 adjusts child's body for ease of manipulation of play materials ; keeps his /her body and face always visually available to the child

IV Facial expression: degree to which facial expression is alert, animated or expressionless (parent)

1 flat, expressionless

2

3 moderately animated (part of the time)

4

5 highly animated

V Vocal appropriateness: degree to which voice tone and lang. is appropriate to child's developmental level and emotions

1 vocally inappropriate (fast paced, or artificial, or no room for child to [respond] talk)

2

3 may have appropriate tone but not pace or vice versa

4

5 voice and language is geared to child's developmental level and state majority of time takes account of child's (response) conversation.

VI Vocal expression: vocal animation and amount of vocalization - parent

1 flat tone, rarely speaks

2

3 moderate variability in expression, speaks occasionally

4

5 gentle rhythmic voice tone, talks frequently, substantial variation in pitch

VII Pleasure with child: expression of positive affect

1 never expresses pleasure with the child, little praise for the child

2

3 Occasionally expresses joy and laughter and/or gives some praise

4

5 frequent expressions of joy and laughter lots of praise and affection

VIII Displeasure with the child: expression of negative affect

1 reprimands child continually, highly critical, annoyed, angry at child

2 several strong negative reactions to child

3 several negative reactions but not continuous or frequent.

4 1-2 mild negative reactions

5 no negative reactions to child

IX Use of developmentally appropriate materials:

1 materials are developmentally beyond the child's abilities or too easy, child appears frustrated or bored

2

3 parent chooses materials that are appropriate to child's level but used inappropriately or appropriate use of materials only part of the time.

4

5 materials are appropriate to developmental level of child - offer a challenge but not too frustrating

X. Adaptive Behaviour: Parent's ability to read the cues his/her infant gives and respond to meet child's needs.

1 Parent rarely or never reads and responds to the child's signals indicating his/her needs.

2

3 Occasionally reads child's cues - but sometimes fails to perceive child's cues

4

5 Parent adapts to child's cues i.e. soothing child when necessary, placing toys in appropriate locations to facilitate play, responding to child's play cues.

XI. Physical Contact: Amount of non-functional handling

1 never touches the child other than to position the child - no holding, touching or caressing; or too much non-functional handling - it interferes with interaction.

2

3 holds or touches the child occasionally

4

5 appropriate degree of physical contact or non-functional touching - holding, touching, caressing. It does not interfere with interaction. It provides nuturance and support.

XIII. Choice of special activity : In choosing special activity to do with their child (last three minutes).

1 Is unable to choose a special activity that interests both the parent and child

2

3 Mother initially seems at a loss in choosing an activity but eventually succeeds in finding something that interests the child.

4

5 Chooses an activity which is something enjoyed by both parent and child.

XIV. Enjoyment of special activity

1 The child does not enjoy the activity chosen by the mother

2

3 The child demonstrates some enjoyment of the activities presented by the mother.

4

5 The child shows a great deal of pleasure with the activity throughout the session.

Total Score (parent section) _____

Child Measures: The following questions refer to the child's behaviour during the play session

I. Facial Expressiveness: of the child - changing expressions in response to situation include both positive and negative expressions

1 no expression

2

3 moderately animated

4

5 highly animated .

II. Smiling:

1 Never smiles at parent during play session

2

3 Smiles occasionally at parent (approx. 4 times)

4

5 Child smiles frequently at parent

III. Maintaining Eye Contact:

1 Never makes eye contact with the parent

2

3 Child occasionally looks at parent's face

4

5 Child frequently looks at parent's face

IV. Degree of vocalization: (not crying)

1 not vocal, does not vocalize at all during the session

2

3 Occasionally makes vocalization

4

5 high degree of vocalization, making appropriate sounds for the child's developmental level

VII. Activity level of the child

1 inactive, does not move unless moved by the parent

2

3

4

5 highly active, spends no more than 10 sec. without gross motor

Initial State of the child (circle the number)

1. sleeping
2. drowzy, semi-dozing
3. alert and passive
4. alert and active
5. agitated, fussy
6. crying

comments: _____

Predominant State of the child (circle the number)

1. sleeping
2. drowzy, semi-dozing
3. alert and passive
4. alert and active
5. agitated, fussy
6. crying

comments: _____

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