THE EFFECTS OF AN INFANT STIMULATION/PARENT EDUCATION PROGRAMME ON INFANT DEVELOPMENT

by

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THIS THESIS IS DEDICATED
TO MY HUSBAND, BARRY,
WITH THANKS FOR HIS LOVE
AND SUPPORT.

ABSTRACT

An infant-stimulation/parent-education programme was presented to mother-child dyads participating in one of three types of classes: a structured twenty-two session group, an unstructured twenty-two session group, or a structured eleven session group. Babies from all three groups as well as those from a control group were tested three times (pre-test, mid-test, post-test) during the course of the programme on the Bayley Mental Test of Infant Development, the Uzgiris/Hunt Ordinal Scales of Psychological Development and the Denver Screening Test. Results of these tests indicate that the structured twenty-two session group received the most benefit from this type of intervention. The structured eleven session group experienced a surge of benefits from this type of programme during the latter part of the course.

EXTRAIT

Un programme de stimulation infantile et d'éducation parentale a été présenté à des diades comprenant à la fois la mère et l'enfant.

Les diades assistaient à l'un des trois types de classe: un groupe de vingt-deux sessions structurées, un groupe de vingt-deux sessions non structurées ou un groupe de onze sessions structurées.

Pendant le programme, les bébés des trois groupes, de même que ceux du groupe contrôle, ont été testés trois fois (pré-test, test, post-test). Les tests utilisés étaient: Bayley Mental Test of Infant Development, Uzgiris/Hunt Ordinal Scales of Psychological Development et Denver Screening Test.

Les résultats de ces tests ont indiqué que le groupe ayant reçu vingt-deux sessions structurées ont le plus bénéficié de ce type d'intervention. Le groupe de onze sessions structurées a connu plus d'avantages dans ce type de programme pendant la dernière partie du cours.

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CHAPTER I

INTRODUCTION

Studies have shown that cognitive and social behaviour depend on a broad band of intellectual and social abilities, each of which develops at a different rate and is dependent on the continuous inter-action between a person's genetic predispositions and environmental influences (Bayley and Schaefer, 1964; Hunt, 1961; Hunt and Kerk, 1971; McCall, Hogarty and Hurlburt, 1972). Because of the ability to compensate for deficiencies in the various areas of behaviour, reduced experience in one dimension may be compensated by experiences received through another. In simple terms, this implies that later experiences can attenuate or enhance the

effects of earlier ones. Furthermore, it is not necessarily the quantity of time the mother spends with her baby, that is fundamental to normal development, but rather, the maternal behaviour in the presence of the baby that is important (Caldwell, 1970). For example, according to Dennis and Sayegh (1965), it is the lack of experience in different positions in space that results in delayed and deviant gross motor development in institutionalized infants. Also it is minimal contact stimulation that apparently retards the degree of cumulative development (Casler, 1965), whereas a high level of physical contact seems to enhance cognitive development (Lewis, Goldberg and Campbell, 1969) and intelligence (Yarrow, Rubenstein, Pederson and Jankowski, 1973).

It is apparent that the cognitive-perceptual and social-emotional development of a child are intertwined. Development proceeds through a sequence of regular restructuring within and between the infant and his environment. Infants seek out stimulation, attend selectively and constantly desire stimulus change. The caregiver (usually the mother) mediates the infant's interaction with the inanimate environment by providing the child objects for manipulation and places for exploration. However, again the provision of, for example, toys alone is not significant (Williams and Scarr, 1971). Rather, the toys must be part of the social interaction in order to affect both gross motor skill and intelligence

(Clarke-Stewart, 1973). It should not be forgotten that it is the infant who often socializes the adult, causing him to become sensitive, responsive, and supportive, thereby aiding the process of producing a competent child.

Infant tests of intelligence have been noted as being rather poor predictors of later intellectual level. However, qualitative estimates of intelligence made in infancy may be of value in that one can make successful predictions from the infant's general level of functioning. The usefulness of such tests as predictors of later intelligence seems to vary as a function of age of initial testing and the time interval between initial examination and retest. For the most part,

> the earlier the test is administered, the lower the correlation with later tests of mental ability and the shorter the interval between the test and retest, the larger the correlation" (Elkind, 1967, p.362).

Thus, attempting to measure infantile intelligence is often most difficult.

While measurement of infantile intelligence is a most difficult task, assessments have proven valuable in that it has been illustrated that the sensory threshold in infancy may be associated with assertive environmental activity at one extreme and with heightened emotional awareness at the other (Kessen, Haith and Salapatek, 1970). Maternal practices have also proved important in determining later intellectual performance. For example, certain maternal behaviours, such as high

empathy, with six-week old infants were related to higher I.Q. scores and verbal and arithmetic achievement test scores at seven years of age (Brody and Axelrad, 1970). Yarrow, Goodwin, Manheimer and Milowe (1973) claimed that the amount of physical contact, appropriateness of stimulation, responsiveness of the mother to the infant's attempt at communication, the degree to which the mother individualized to the infant, expressed positive affect and was emotionally involved with the infant, were all correlated with I.Q. at the age of ten. Finally, both the Berkely Guidance Study (Honzik and Macfarlane, 1973) and the Fels Institute Study (Kagan and Moss, 1962) suggest that there is a strong association between maternal practices and family environment during infancy and later achievement assessments.

According to Fields (1978), another major reason for doing assessments is to carefully monitor the developmental progress of infants, especially those born at risk and to identify those children who are high risk. An example of those born at risk for which variable outcomes are likely to have been reported is that of the preterm respiratory distress syndrome (RDS) infant. It is noted that these babies experience early developmental delays but by the age of four tend to have normal I.Q. scores. However, these children appear to have an increased incidence of language production delays and often exhibit symptoms of minimal brain dysfunction. Post term post-

maturity syndrome infants are an example of a group who experience more subtle perinatal insults and are not classified at risk, but often exhibit developmental deficits, especially in the area of social development, severe illnesses, sleep disturbances, reading disabilities and neurological handicaps (Lovell, 1973).

The variability of outcomes for these groups suggests the importance of finding early assessments or predictor variables which might identify those RDS infants continuing at risk and those post-term postmaturity syndrome infants developing deficits. Early predictors of later outcome had previously been investigated for non-risk samples by Broman, Nichols and Kennedy (1975) and for prematures by Parmelee, Sigman, Kopp and Haber (1975).

If the establishment of emotional attachments and basic trust have their critical periods during the first year of life, then it is true that cognitive development must also have a critical period in infancy. The reason for this is that, for the infants, intellectual and affective functions are undifferentiated (Elkind, 1967). Thus, it appears that anything which affects the child's affective equilibrium also affects his cognitive functioning. The lack of appropriate social and affective stimulation in infancy can lead to negative consequences in both personality and intellectual development. It appears that the nature and quality of the stimulation that the infant receives

may have enduring effects.

In light of these findings it must be appropriate to assess both infant developmental levels and the maternal stimulation practices that may affect them. The focus of the present study is thus to note the effects of different parent intervention models on development. These models include infant stimulation techniques and the education of parents in stimulatory activities and problem solving skills. The present investigation is an attempt to introduce early infant intervention strategies with normal mother-infant dyads and to assess its affects on developmental tests of sensorimotor and cognitive ability. Questions such as can one accelerate cognitive, language and sensorimotor development, which areas of development are most affected, are there qualitative differences in development and which tests are most sensitive to the performed abilities of the children, were asked. Furthermore, using a battery of tests selected for infant assessment in this investigation it was questioned whether the amount of time parent and child attended the programme and the type of parent education programme itself were relevant factors in the success of such an intervention strategy.

CHAPTER II

REVIEW OF THE LITERATURE

HISTORY OF THE DEVELOPMENT OF EARLY INTERVENTION

The importance of environmental influences on the infant has been acknowledged by many throughout the history of psychology. Dating back to the seventeenth century, John Locke noted the significance of early experiences for the acquisition of knowledge, learning and socialization. Others since his time have also recognized the fact that early care affects the health, biological, and mental development of the growing child (Goldfarb, 1943; Spitz, 1945; Watson, 1957; Winterbottom, 1958). In particular, it has been shown in the research of Skeels that individualized care of biologically and mentally disadvantaged children

could prevent further developmental decline and, at times even reverse their development (Skeels and Dye, 1939; Skeels, 1966). These results suggest that the effect of environmental interventions are greatest when the most rapid development normally takes place in the human organism during the periods of infancy and early childhood. Bloom (1964) has noted that at least half of the variation in adult intelligence can be accounted for by the age of four. As a result, a renewed interest in early childhood development has absorbed a great deal of the current attention of psychologists.

a) Stimulation During Infancy

An interesting interpretation of the benefits from early stimulation comes from Zern (1974). He suggests that stimulation is experienced by the child as an unpleasant and frustrating intrusion and not as something enjoyable. The child is thus motivated to achieve appropriate skills in order to eliminate the stimulation, thereby resolving the disequilibrium that has been created.

It had been previously argued that a diverse and extensive quantity of stimulation is a valuable and even necessary experience for all living organisms. For example, White (1971) claimed a child is better off with a mobile in his crib than without. Casler (1961, 1968) argued for the importance of stimulation in a purely physiological vein stating that a

variety of stimulation is both necessary and sufficient to elicit physiological alerting reactions in the reticular formation. The latter, in turn, are seen as playing a "critical role in the learning process" (Samuels, 1959, p.20). Robert White (1959, 1960, 1963) supported the notion that a child actively seeks out stimulation and interaction as a means of development. Thus, he has a significant intrinsic need to deal with the environment.

According to Zern, based on Piaget's notion of assimilation and accommodation,

> an organism is forced to develop by the impingement of external stimuli to which it finds it necessary to adapt. If stimuli were absent, the organism's schemata would not be disturbed and the original equilibria would be maintained. (Zern, 1974, p.328).

Therefore, stimulation is valuable because the organism is continually seeking to reduce the level of stimulation, thereby developing higher level skills for dealing with the environment. Thus, two components are necessary for the development of the child. First, disequilibrium must exist in order to induce the child's activity. Secondly, the capacity to resolve this frustrating disequilibrating state by the child must be present.

Both Zern's approach to stimulation and the more traditional position support the importance of the mother in the child's environment and, in particular as the mediator of stimulation. While Zern purports the notion that the mother

is a critical tool in fostering disequilibrium, as well as in helping the infant learn how to resolve the intrusive effects of various kinds of stimulation, other psychologists express the idea that the mother is the dominant social source for the infant's stimulation. According to Caldwell (1963) mothers progressively develop confidence about their care of infants and the infants' well-being. As this occurs, interaction increases. A mother's early interaction may facilitate or interfere with an infant's adaptive development (Ritvo and Solnit, 1958). Disturbances in a mother's early attitude toward her infant may lead to a chronic disturbance in the mother-child relationship (Bibring, 1961) which, in turn can affect her effectiveness as a stimulatory source for the child. Furthermore, the quantity and timing of a mother's response to the infant's behaviour and consistency of her response play important roles in developing and reinforcing the infant's belief that his behaviour can affect the environment (Lewis, 1972).

The importance of the relationship between infancy and experience has been expounded upon by Fowler (1972). He has claimed that "infancy is the most malleable, rapidly changing and least organized period of human development" (Fowler, 1972, p.341). He notes that it is also the time of greatest potential for establishing basic forms of understanding, style and feeling. In other words, infancy, for Fowler, is the early

matrix from which all later development is generated. It is through the cumulative effects of early mental interaction that the infant experiences the gradual emergence of affective-cognitive-perceptual-motor rule systems develop. These systems, in turn, affect value hierarchies, the organization and processes of the social and physical world, provide the rules for acting on or operating in the world, and the rules for coding, communicating information and acting symbolically about the world. Fowler has based much of his theoretical perspectives on the work of Piaget (1952). According to Piaget, play is the critical element for the development of the child. It

> generates experimentation and (creative) construction to extend, generalize, elaborate, test and consolidate mental processes developing through other experiences (guided stimulation), as well as providing stimulation of its own. (Piaget, 1952, p.348).

Thus, children bring their previously assimilated organizations to each environmental encounter. In the course of accommodation these organizations change the demands of the situation whose process is continuous (Hunt, 1972). This interactionistic view of psychological development differs from the Gestalt theory of naturism and from the predeterminism of Gesell (1954), yet it avoids the extreme plasticity of a multiplicity of reflexes (Watson, 1924). Hence, the studies Fowler carried out in order to test his notions regarding the importance and malleability of early infancy were

anchored in sensori-motor play. However, he continually emphasized the notion that emotionally sensitive attitudes are needed in order to develop curiosity, complex interests, autonomy with respect to problem solving, and creativity and co-operation in social relations (Hunt, 1972). These feelings and motivation can result primarily through the attitudes and styles adults use in handling their infants (Fowler, 1972).

Fowler examined both intellectually gifted and economically disadvantaged children and their respective environments. He felt that it was important to study the former group since they provide relevant clues as to the function of early cognitive stimulation. He provided the stimulation both early and intensively for individuals who displayed superior ability (Fowler, 1962, 1967). Following the work of Skeels (1966) and Bloom (1964) and noting the differential rates of growth of selected human traits, he then implemented some of the strategies developed on a group of disadvantaged children during the period of most rapid development (infancy). In this programme, the methods of care and stimulation were developmentally adapted and sequenced to the processes and understanding of the age period of the child (Fowler, 1968, 1969, 1970). The programme was organized in terms of perceptual-cognitive processes, socio-emotional relations, motor development and physical health. The components of the

programme included student teacher education, parent guidance (with respect to play methods, child rearing and stimulation) and an infant stimulation programme per se. Results of these efforts showed that all forms of functioning showed definite improvements or good adaptation. Cognitive gains on the battery of tests that he developed (Fowler, 1968, 1969, 1970) were high for both general cognitive ability and several specific forms of competence including language comprehension, social competence and cognitive motivations (curiosity and goal directedness). The conclusion reached was that a programme following the general principles of cognitive stimulation, in conjunction with stress on emotional care and social relations produces general changes in intellectual development - 'g' (Spearman, 1904). Furthermore, he stressed that stimulation programmes should begin at or before one year of age and should be continued for as long as possible in order to produce greater facilitation of infant learning and information processing.

Fowler and his colleagues went on to examine more specific areas of stimulation. One of his current foci centres upon language stimulation. In a series of four studies conducted by Fowler and Swenson (1979), infants between the ages of five and twelve months were stimulated in language processes. Parents, once again served as tutors in that they provided labelling in caregiving and play activities. The infants were from different language

communities and parent educational levels. Using the Griffiths Scales of Mental Development (Griffiths, 1954), Reel Scale (Bzock, 1971), measures of parent stimulation and language development, the results indicate that mean language gains exceeded what would have been expected had no intervention been introduced. For the most part, follow-up scores when the children were eighteen months remained stable. Furthermore, through forty-two months some of these infants were not only superior in language skills, but also in counting. Thus, there proved to be a significant difference between stimulated infants and controls on not only language abilites, but also on at least one other non-language measure. The authors conclude that although there existed a

> constant acquisition order for basic language dimensions ... rate and content were highly influenced by experience (Fowler and Swenson, 1979, p.75).

b) Support and Criticisms of Intervention Programmes

Major criticism concerning these intervention programmes and the theories about intervention in general have been voiced (e.g. McCall, 1979, Jensen, 1969). It is of particular interest to note the work of Jensen (1969) who posits the idea that the environment operates in a threshold fashion. Once environmental circumstances are sufficient to bring out normal development further attempts at enrich-

ment can bring nothing more in the rate or in the terminal level of development. Jensen, as well as other genetically oriented psychologists, agree that gross environmental deprivations (e.g. orphanages) can interfere with development, but they contend that the variations in the development-fostering quality of conditions among families are minimal and that little change can be expected from attempts to improve conditions.

A second point Jensen makes is that correlations between I.Q. scores derived from tests made at an early age with gains in mental age over a given period of time fluctuate around zero. Therefore, infant tests appear to measure only past achievements and not future ones. In particular, the scores from standard tests tend to say little about individual differences in rates of psychological development. However, this point becomes rather weak when noting the work of Hunt who claims, for example, that

> achieving top-level object permanence early need imply little or nothing about future cognitive and language development unless one has knowledge of development along other lines and/or of the environmental circumstances, both inanimate and social, with which the infant is interacting (Hunt, Paraskevopoulos, Schickedanz and Uzgiris, 1975, p.259).

In other words, they conclude from empirical evidences that the constancy in the I.Q. or developmental score have bases other than genetic influence, contrary to the opinion of Jensen (Hunt et al, 1975). Thus, if such is the case,

appropriate interventions may hasten the development of concepts such as object permanence in infants of families of poverty (who usually show a lag in conceptual development) to a rate beyond that of infants from middle class families (Hunt et al, 1975). The critical question remains, however, as to the impact of intervention and stimulation in normal children from secure middle class families.

It has been noted time and again that it is difficult to screen infants because of the wide range of inter and intra-individual variations at that age. Furthermore, there seems to be an inherent inability to communicate subtle perceptions and sensations (Meier, 1976). However, infant screening and assessment procedures are amenable to preventative treatment in that there is a possibility of detecting certain abnormalities. At this young age, the child demonstrates considerable cognitive or hypothesis-forming abilities (Kagan, 1972). Also, it is possible to assess the context within which the infant is growing and developing (Starr, 1971). Thus, although there are major discontinuities in early cognitive development that interfere with predicting later ability from early testing, because of the inter-relationships among physical, intellectual, language and socio-economic factors previously mentioned, intervention can be initiated when an abnormality is noted in any one of these areas. Finally, researchers still support infant tests such as the Bayley Scales with

respect to its ability to differentiate infants in terms of 'high' versus 'low' cognitive development (Holden, 1972). Sensorimotor development correlates with later cognitive functioning approximately seventy per cent (Cromwell, 1973). Thus, using a battery of tests assessing a variety of influences and functioning can prove beneficial (c.f. Fields, Hallack, Ting, Dempsey, Dabri and Shuman, 1978).

c) Developmental Tests and Measures

There has been an enormous increase in the number of infant studies in the past twenty years primarily due to the increased availability of infants and the increased emphases on the origins of behaviour (Kessen, Haith and Salapatek, 1970). However, recent critiques of the generalizability of developmental principles raise the question of whether one can expect the psychological study of human development to yield durable principles that are valid across changes in time, culture and cohorts (Weisz, 1978). Furthermore, it has been claimed that changes in our society are outpacing the recording of reliable developmental findings (Bell and Hertz, 1976). Specifically, it has been claimed that

> if both long and short-term changes in parent and child behaviour are occurring ... obviously, research progress must be faster. Otherwise, findings may no longer be applicable to the populations for whom they are intended (Bell and Hertz, 1976, p.6).

In other words, measures must be developed to keep pace with the changing ideas regarding the influences parents have over their children.

A second point of interest focuses in psychological universality. For example, Buch and Moriss (1975) argues against the Piagetian notion that a general theory of cognitive development is possible on the assumption that formal structures of thought are abstract rather than concretely tied to environmental factors. They claim that the cognitive maturity that is tapped on Piagetian-type developmental tests are merely reflections of a particular socio-economic structure and not on some universal truth. In short, modern views suggest that short-term, context bound validity is the best one can hope to obtain from infant developmental tests. These points aside, it is important to note that the field of infant assessment had its beginnings rather early in time.

Arnold Gesell was a prime innovator in the field, Basically, he felt that the need to develop diagnostic capability should not overshadow the importance of the "process" of growth (Yang, 1979). Thus, he developed scales that would be useful in determining both the capacity and the personality of the child. His initial scale developed in 1929 included one hundred and forty four items measuring motor behaviour, language behaviour, adaptive behaviour (such as eye-hand co-ordination) and personal and social behaviour. In 1940

the schedule was revised to include finer gradations of response in which he proceeded to plot the development of an average individual. However, when Witternborn, Astrachan, Degooyer, Grant, Janoff, Kugel, Myers, Riess and Russell (1956) examined the predictive validity of the schedule, it was found that the correlations between the Gesell General Maturity Quotient and later Stanford-Binet scores were uniformly low (the average correlation being .09).

Today, this test is only used as an obtuse, qualitative holistic descriptor representing the totality of a child's functions. Although it does superficially acknowledge the interplay between genetics and environment, it is clear that Gesell saw development to be primarily a result of a maturational unfolding process virtually unaffected by external influences (Yang, 1979).

The Cattell Infant Intelligence Scale, unlike Gesell's schedule, was designed by Psyche Cattell to correlate with the Stanford-Binet. The items on these scales are similar, however, to those on the Gesell scales. Cattell emphasized the predictive power of her tests without respect to age. She suggested attention be paid to clinical and other subjective impressions of infants not especially related to tests or testing situations. In spite of this recommendation, however, correlation between the Cattell and WISC Scores (Wechsler Intelligence Scale for Children), as was

the correlation between the Gesell and WISC scores, was extremely low (.05 and .08) respectively. For a more complete critique of the Gesell and Cattell tests refer to Yang (1979), Escalona (1950), and Escalona and Moriarity (1961).

The Bayley Scales of Infant Development (BSID) were designed to assess children, taking into account the theoretical contributions dealing with the nature of early childhood development and which have norms based on improved sampling methods. In particular, The Mental Scale of the BSID draws upon three California First-Year Mental Scales. (Bayley, 1969; Jaffa, 1934).

The scale was revised in 1958 which now allowed the assessment to cover the first fifteen months of life. Shortly thereafter, the scale was expanded and extended to include the child's second year. This 1958-60 version (as it has been called) has one hundred and sixty three items on the Mental Scale.

> It has been standardized on a sample of 1,262 children, distributed in approximately equal numbers among fourteen age groups ranging from two through thirty months (Bayley, 1969, p.2).

Because of the fact that this test is so widely used today in research, it is important to detail its appearance. Firstly, due to the fact that an infant has no "set" for following directions and solving problems at the request of an examinaer and will only respond to those situations and

tasks that capture his attention and interest, the items on the BSID measure relevant behaviour variables by means of stimuli which are attractive to the child. Furthermore, the abilities tapped do not array themselves into concurrently developing "factor" of mental functions (Bayley, 1969) and is, therefore, different from other tests of child development. Originally the items on the mental scale included

> tests of adaptability or learning and tests of sensory-motor acuity and fine motor (manual) co-ordinations (Bayley, 1933, p.24).

The revised edition also assesses the early acquisition of object constancy, memory, and problem-solving ability, the beginning of verbal communication, the ability to form generalizations and classification (which is the basis of abstract thinking).

> Results of the administration of the Mental Scale are expressed as a standard score, the MDI, or Mental Development Index (Bayler, 1969, p.3).

Correlations between the bayley mental scale and the Stanford-Binet have ranged from minimal to moderate (Yang, 1976). Furthermore, contrary to the results found on the Catell and Gesell tests, Ramey, Collier, Sparling, Loda, Campbell, Ingram and Finkelstein (1976), found a high correlation between the Bayley Mental scores and the Stanford-Binet scores. Thus, the predictive power of the scales are high, reflecting the genetic composition of intelligence.

Another test that deserves considerable attention is the Ordinal Scales of Psychological Development (Uzgiris and Hunt, 1975). In contrast to traditional tests which assume an incremental progress of development in children, these scales imply a hierarchical relationship between achievements at different levels so that the achievements of a higher level are intrinsically derived from those at the preceding level (Uzgiris and Hunt, 1975). In addition, in comparison to traditional tests of intelligence in which achievements are grouped together on the basis of their co-occurrence at a particular chronological age, the ordinal scales have separated the issue of sequence from association with chronological age.

Many tests that have been devised to assess children have reflected the assumption that psychological development in infancy reflects essentially a unitary process similar to Spearman's (1904) general intelligence. The untenableness of this assumption, however, has been recognized by researchers such as Bayley who has, for example, divided the Bayley Scales of Infant Development into spearate Mental and Motor Scales (Bayler, 1969). The Hunt Uzgiris test is sub-divided to include six scales:

(a) Visual pursuit and permanence of objects,

(b) Development of means for obtaining desired environmental events,

(c) Development of imitation (vocal and gestural),

(d) Development of operational causality (antecedent-consequent relationships).

(e) Construction of object relations in space (tracking and locating objects),

(f) Development of schemes for relating objects (Uzgiris and Hunt, 1975). The scales are based on the Piagetian theory of stage development (Piaget, 1956) and there is a high inter-correlation between scales (Yang, 1976). A developmental age (DA) is computed for each infant which

> consists of the sum of items successfully performed by the infant regardless of the nature of the items (Uzgiris and Hunt, 1975, p.13).

This summation procedure implies an additive view of developmental progress. Any item can be substituted or compensated for any other since each item is given equal weight. Because the test items have no special significance in themselves, the derived DA only derives significance from comparisons with the summations for other individuals. One may also compare the degree to which an infant is advanced. These norms are the distribution of ages

> at which a representative sample of children achieve each of the landmarks of development on each of the scales (Uzgiris and Hunt, 1975, p.18).

This test, according to Yang (1976) has been shown to have moderate to good predictability.

The Einstein Scales of Sensorimotor Intelligence (Escalona and Corman, 1969) are based on Piaget's theory as well. It assesses children who are between the ages of one month and two years. The test is composed of three scales: prehension (which covers the development of adaptive reflexes); object permancence (which covers the growing awareness of the environment); and space - (which involves the infant's ability to function effectively in three-dimensional space). Following from Piagetian theory, the scales define four stages and two substages that are passed through sequential order. This test, however, is not as complete as that of Uzgiris and Hunt (1975).

The Denver Developmental Screening Test (DDST), was created in order to provide a simple method of screening for detecting slow development in infants and pre-school children (Frankenburg and Dodds, 1967). The DDST taps four functions: gross motor, language, fine-motor-adaptive and personal-social. The greatest conveniences of this test are that it is easy to administer, score and interpret and is useful for repeated evaluations of the same child (Frankenburg and Dodds, 1967, p.182). When the test was initially developed, the plan was to determine the ages at which ten per cent of the children could perform each test item.

> However, for a majority of the developmental tasks measure in this study it was difficult to arrive at a meaningful ten per cent passing age because the children's ability to do

> the items appeared abruptly in the age scale; that is, most of the children in one age group could not do an item, but considerably over ten per cent in the next age group could (Frankenburg and Dodds, 1967, pp. 189-190).

Thus, it appears that the appearance of many skills is not linear, but once they start, they rapidly accelerate.

The DDST is a screening device and is not an intelligence test. It simply enables the examiner to note whether a child's development is within the normal range. Caution in the interpretation of the results must be exercised for there may be many reasons for a child not performing a particular task, only one of which being an actual developmental delay. Temporary unwillingness, fatigue, and illness, can affect the infant's behaviour. Valuable information regarding the child's emotional development can also be ascertained by observing his behaviour in the presence of his parents during the examination. According to Meier (1976) this test has rather good predictive ability.

In conclusion, the Gesell, Cattell and Bayley Scales are quantitative in nature, tapping genotypic and maturationally determined behaviour. On the other hand, the Einstein and Uzgiris/Hunt scales are qualitative measures of the ordinal progress of development as outlined by Piaget. In general, it appears that the earlier in infancy the initial test is given and the greater the time between initial and final testing sessions, regardless of the scale used, the poorer the predictive relationship to later intelligence

performance. However, this fact does not negate the potential to use these scales (especially the Bayley, Uzgiris/Hunt and Denver), to assess the current developmental level of the infant.

The Newborn and Stimulation

Effects of Environment

In contrast to the theoretical assumptions of the western educational theories known as "Romanticism" (maturationist theory) and "Cultural Transmission" (associationistic-learning theory), it appears that the majority of stimulation programmes for infants follow the "Progressive" (Cognitive Developmental Theory) school of thought (Lambie, Bondy and Weikart, 1975). That is, education is seen as the creation of challenging learning-appropriate environments. The child thus develops through active engagement with and problem-solving in his environment. Cognitive development is viewed as passing through a sequence of stages and thus, is not wired in at birth. The variety of cognitive abilities a child displays emerges from increasingly complex transactions with the environment. Thus, the cognitive ability of the child results from the cumulative acquisition of concepts that derive from actions performed by the child. The child is an active agent,

constantly testing hypotheses as to how he thinks the world operates (Lambie et al, 1975).

Each and every newborn is equipped with a potential for physical, mental and emotional development. Furthermore, he learns to use this potential in a complex fashion for learning and thinking. His capacity for behaviour rests within his midbrain during the first three months of life. For the most part, he reacts reflexively, monitoring and storing relevant stimuli for later use. At birth, there are intricate pathways throughout the child's nervous system that are ready to be set off by the appropriate signals.

> A mother automatically uses these signals as part of her mothering (Brazelton, 1969, p.24).

For example, in the feeding situation, the mother stimulates the child's lips and mouth as she inserts the nipple and holds him such a way as to allow him to engage in his reflexive rooting, sucking and swallowing behaviour. The infant's cortex is prepared to learn with each reaction and to store the effects of all his experience.

Thus, the infant is constantly receiving and reacting to stimuli which, in turn set off a series of reactions, ultimately leading to some automatic or reflex action. In order to "learn" the importance of particular stimuli in the face of such bombardment of new stimuli, the infant must initially posses the ability to select which ones he

will receive and react to. Strong preferences are clearly observable even in the delivery room. However, lack of appropriate stimulation is a devastating kind of experience to the growing neonate. It is true that too much handling and anxious stimulation may create such reactions as excessive crying and/or colic. But, too little stimulation can lead to subtle forms of interference with development and growth. While an infant's physiological growth depends on proper nutrients being fed to him at natural intervals, his emotional growth needs encouragement and nurturing stimulation. Without them, he will pass through critical periods of development with no progress from one stage to the next (Brazelton, 1969). Institutionalized children who are maintained physically but not emotionally often manifest the effects of such deprivation are often cited. Although they start out as normally demanding babies, because those around them only respond with infrequent, sterile encouragement, the babies' requests become less frequent, their demands less forceful, their cries less strong and they turn inward (Brazelton, 1969). Social responses to outside persons become those of apathetic curiosity or anxiety and cognitively they exhibit delays.

Specifically, it has been noted that the harmful effects of institutionalization are a consequence of the

absence of mother love. Still others claim that perceptual deprivation is responsible for the developmental lag. Casler (1965) assumes a third position in stating that the deleterious consequences are a manifestation of contact deprivation. He cites various researchers who have theorized that tactile stimulation during infancy, and especially during the first few months of nursing is of fundamental importance to the development of the child. Furthermore, it has been experimentally established that responsiveness to tactile stimulation is generally greater during the early days of life than it is to auditory or vestibular stimulation (Casler, 1965). This has been accounted for by the suggestion that there are sympathetic connections from the skin to the sense organs so that patting and cuddling may act as a massage to release muscular tension. The infant gains security and experiences the kinesthetic sensations of being held and supported. The sight and sound of an approaching adult is often not enough to reassure the infant and thereby assuage his crying. However, the actual handling of the child is. These claims lead to the rather positive conclusion that any source, even an impersonal caretaker, may be a satisfying 'mother-figure' so long as the dosage of stimulation are appropriate.

Evidence for Casler's claims come from both rat and cross-cultural studies. However, no systematic study of

the effects of extra tactile stimulation on human infants had been conducted up until that time. The reasons for this are twofold: first there was the difficulty of gaining access to large institutions where many subjects under well controlled conditions would be available; and secondly there was the prevailing opinion that effective needs of the baby are important and thus the investigation of particular modes of sensory stimulation were only of secondary importance. Casler proceeded to rectify this situation. Using sixteen babies that resided in the Hebrew Kindergarten and Infant Home in New York, as subjects he designed an experiment to test his theory. Two women, designated as "Handlers", were hired to provide the tactile stimulation. Each subject in the experimental group received stroking by the handler (after his attention had been obtained), Monday through Friday, for two ten-minute sessions (one in the morning and one in the afternoon). During each session the handler said: "Hello Baby" once every sixty seconds in a neutral tone in order to maintain attentiveness. The control group was treated exactly as above except that the tactile stimulation was omitted. At no time did the handler look at any baby's face in order to reduce the possibility of the baby responding to social rather than tactile stimulation. This procedure lasted for ten weeks.

In general, the results of this study support the

hypothesis that institutionalized infants, after receiving one thousand minutes of added tactile stimulation, function at a higher level as measured by the Gesell Developmental Schedule than institutionalized infants who do not receive this added tactile contact. Particularly, the "adaptive", "language" and "personal-social" scores for subjects in the experimental group were higher than for those in the control group. One must note, however, that tactile stimulation is only one of the many forms of stimulation believed to be necessary, in suitable quantities, if the human organism is to develop properly. Despite the extra handling received by the experimental group, it may be assumed that the other modalities of perception remained under-stimulated, with consequent ill effects (Casler, 1965). Even here, however, the experimental group declined only half the amount than did the control group. Casler concluded that although none of the forms of functioning (motor, adaptive, language and personal-social) appear to be directly related to tactile stimulation, all but the first form responded positively to the experimental treatment. It is, therefore, plausible to believe that tactile stimulation is only the first link in a chain, which causes something to happen within the organism from which the measurable differences in the Gesell scores arise. Before accepting these results as conclusive evidence, it must be noted that the babies in the experimental group

received more stimulation, per se than did their controls and, therefore, the effects to be expected from any type of additional stimulation must be considered. Furthermore, one should keep in mind that it is not the stimulus itself, but rather the response that is made that provides the perceptual and sensory stimulation.

It is also possible that a critical period exists during which perceptual stimulation is especially influential. The reticular structures play a critical role in the learning process. Skin stimulation will activate that reticular formation before other forms of stimulation will. Thus, for example, it has been found that three-month old babies exhibited increased rates of vocalaization after receiving a combination of visual, auditory and, especially, tactile reinforcement (Casler, 1965). The results of the reported experiment suggest a causal connection between stimulation and language development.

There also appears to be some continuity between Harlow's findings, suggesting that personal-social functioning can be positively influenced by tactile stimulation or as he refers to it, "contact comfort". If according to Harlow, adequate personal-social functioning stems from a feeling of security when in the earliest stages, Casler concludes that an infant's security must be a matter of skin contact and of kinesthetic sensations of being held (Casler, 1965).

The point of this rather elaborate discussion is to stress the importance of one's environment. In Casler's work, it appears that the normal development of behaviour depends on a normal perceptual environment and that a child is fundamentally dependent on his perception, past or present. A mother, or even an investigator may be the source of this form of extra stimulation. The effects of early experience can thus delay or modify the sequence of natural development. Variables such as marriage, parenthood, socio-economic status, and availability of a stimulating environment all influence the infant. As Beckwith states,

> the question is no longer whether early experience with the caregiver can influence the human infant's cognitive, social and affective development. The questions are: how, in what ways, and with what relative effectiveness for what age infant do specific dimensions of the mother-infant interaction operate; which effects persist, at what later ages, and how are effects modified or attenuated by intervening experience? (Beckwith, 1976, p.119).

Despite evidence of increased risk for an infant who has experienced prenatal or perinatal trauma, the outcome for babies is strongly related to environmental (in particular caretaking) experiences. For example, there is little data to contradict the significant correlation between socio-economic status and I.Q. scores throughout the entire age range of the child. However, social status cannot be used to understand individual differences within

a group. There are more specific dimensions of caregiver-infant interaction that have been known to affect a multitude of cognitive and social behaviours. The mother or caregiver (Casler, 1965) can then be described as

> the primary perceptual stimulus within the baby's environment and is the most salient and complex, as well as the most contingent to the baby's environment. Furthermore, this caregiver can both provide the stimulation herself and mediate stimulation from the inanimate environment surrounding the child (Beckwith, 1976).

There has been a great deal of controversy as to the amount and intensity of the stimulation that influences the infant. Some studies indicate that the intensity of social stimulation received does not necessarily reflect the overall quantity of time that the mother spends at home with her baby since time at home may not reflect the actual number of contacts (Schaffer and Emerson, 1964). Still, however, the availability of the mother in the child's environment is important. Furthermore, it has been shown that deviant motor development may be the result of lack of infant experience in different positions in space (Dennis and Sayegh, 1965). Ainsworth (1973) suggested that the amount of experience normal infants have with long pick-up episodes that are both tender and careful in nature, in the first half year of life, can be associated with a reduced amount of crying, the active initiation of physical contact and readiness to turn to

independent activity in the last quarter of the first year. This notion has now become a relevant area of enquiry. If what Ainsworth claims is true then the usefulness of infant stimulation can be explored.

Effects of Stimulation

There has been a gaining body of researchers who have obtained results suggesting that stimulation of a specific sensory modality facilitates development of behaviour involving that particular modality. For example, it has been illustrated that visual stimulation enhances the development of visual skills in general and, under certain conditions, even affects visual directed reaching (White, Castle and Held, 1964). Furthermore, stylistic characteristics of the mother (such as soft-spokenness, vigour, etc.) have been associated with the amount and type of stimulation expressed toward her baby. In one such study (Moss, Robson and Pederson, 1969) it was found that a rating of the animation of the mother's voice during an interview when she was pregnant was, in fact, predictive of both the amount and type of stimulation she provided her child with at the ages of one and three months. Specifically, this characteristic of the mother related to the amount of social affectionate stimulation she provided for males and the amount of stimulation of visual and auditory receptors she provided for

females. Even the education level of the mothers proved important in that less well educated mothers tended to provide significantly more physical stimulation to their babies. The positive affects of stimulation were pronounced in the finding that the amount and type of stimulation the mother gave her infant was related to avoidance behaviour toward a stranger when the child was about one year of age. That is, early stimulation, particularly of the distance receptors at three months of age was significantly related to less avoidance and discomfort toward strangers. The conclusion reached by the authors was that

> it seems reasonable to assume that since the distance receptors are those that are most commonly used in our culture for interacting with others, obtaining information and experiencing the environment, auditory and visual experience will be the most relevant as determinants of the child's manner of coping with novel stimuli and managing social encounters (Moss, et al, 1969, p.246).

Another study, conducted by Roe (1978), used a measure he labelled "Differential Vocal Response" (DVR) to an interactive mother compared to an interactive stranger in order to classify three month old male infants. He found that the high DVR group responded significantly below base rate to stimulation by the stranger. In contrast, the low DVR group responded at base rate to both the mother and the stranger. The high DVR group later performed significantly better on

both the Stanford-Binet scale at the age of three years and the Illinois Test of Psycholinguistic Abilities at five years. Thus, the infant's mother-stranger discrimination at three months may be used as a predictor of cognitive development at three and five years.

Bradley and Caldwell (1976) also discussed the relationship between early home environment and the changes in mental test performance of children at a later age. They had previously administered the Bayley Scales of Infant Development to a group of infants at six months, and the Stanford-Binet Intelligence Scale when they reached three years. When each child was six months old, the family had been observed and interviewed using the Home Observation for Measurement of the Environment (HOME) which measures the quality of stimulation found in the child's early environment. Increases in mental test performance at the two ages studied thus appeared related to two subscales on the HOME:

(a) Maternal Involvement with Child, and

(b) Provision of Appropriate Play materials.

Decreases in performance were found to be related to the subscale indicating the inadequate organization of the child's physical and temporal environment. The authors suggested that the results of this investigation illustrate that the home enviornment may contribute to instability of performance on infant tests and that proper mother-child interaction and appropriate stimulation can, in fact, have beneficial results for the developing infant.

A variety of studies dealing with normal children illustrate additional theoretical suppositions. For example, in a study by Falender and Heber (1975) which was designed to assess the effects of the child's participation in longitudinal intervention in a structured[1] mother-child teaching situation. The programme included extensive language and cognitive developmental stimulation beginning when the infant was approximately six months of age. Results revealed a significant gain in behaviour and task scores and a significant improvement in interaction between the mother and child over a control group whose mothers received no task instructions regarding maternal behaviour and whose babies received no stimulation. According to the authors, this provides evidence of feedback effects from the experimental children to their mother. Thus, they believe that the role of the child in such dyads is to act as a director or agent of change in the interaction. This conclusion acquires support from the work of Bradley, Caldwell and Elardo (1979). An analysis was performed to determine the primary direction of effect amont three categories of environmental stimulation and Bayley Mental Development index scores measured at six, twelve and twenty-four months. Results indicated that more capable children tended to elicit higher levels of maternal involvement and theprovision of more appropriate play materials during the six to twelve

1 Please refer to Chapter 3, "Procedure", for a discussion as to the meaning of "structured".

month period. The first result proves necessary for the development of the child in that higher levels of maternal involvement tended to produce more capable children during the twelve to twenty-four month period. The latter result is vital as well for two reasons. Firstly, it has been noted that the purpose of maternal motoric variation in game structures using these play materials is to keep the infants in an optimal state of arousal in order that they better attend to social signals (Stern, 1971). Secondly, the function of interactive play is to enhance infant's exposure to the social information necessary for the development of attachment. Furthermore, according to Piaget (1952), the acquisition of a sensorimotor knowledge of the world during the first year of life occurs through the use of toys in play situations. This enables the infants to respond positively to more sophisticated forms of playful stimulation provided by their mothers (Scoufe and Wunsch, 1972). Infants practise motor patterns modelled by mothers in the context of play as well.

Thus, the importance of early social transactions between mother and child is of critical importance. For example, Yarrow, Rubenstein, Pederson and Jankowski (1973) found positive relations between eight social and inanimate home stimulation variables measured when the infants were five months old and sixteen cognitive variables derived from

the Bayley Scales of Infant Development and from a structured situational test measuring exploratory behaviour and preference for novel stimuli administered when the infants were six months of age. Clarke-Stewart (1973), found a comprehensive cluster of maternal variables reflecting "optimal" maternal care related to a cluster of infant variables reflecting competence across developmental areas. Cohen and Beckwith (1979) noted that the frequency of early social transactions was predictive of the infant's competence at age two on the Gesell Developmental Schedules, a sensorimotor scale, a measure of receptive language and the Bayley Mental Scale. These authors conclude that social transactions as early as one month reflect some quality of relationship between the caregiver and the infant that is important to the child's later mental performance. Also, they suggest that the infant's and caregiver's readiness to engage at one month in positive social interactions with each other as in mutual gazing, mutual smiling, social play, and talking, may be somewhat important to the infant's nine-month test performance, but appears to become even more significant as the infant advances from the first to the second year of life. That is, early social smiling behaviour of the infant and caregiver appear to be the components of a social relationship between the members of the dyad and if continued, promotes mental development. Thus, it is useful

to think of the cumulative effects of caregiving based on some continuity in caregiving over time (Yarrow, Rubenstein and Pederson, 1975).

The importance of all the forementioned studies dealing with mother/child interaction and stimulation is revealed when considering the applicability of such theoretical notions to practical situations. According to Hunt (1973) and Gordon (1969) even short-term intervention efforts produce significant effects on both the mother and child. For example, Rheingold (1956) invested an eight week stimulation effort, following which the experimental children maintained verbal superiority one year after programme completion. It has been postulated that this fact resulted due to the increased skills in eliciting verbal stimulation from caretakers in the family setting, thereby leading, in general, to the maintenance of higher vocalization levels (Horowitz and Laden, 1973).

Thus, to summarize, relating these points to the Falender and Heber (1975) study discussed earlier it is evident that the consistency in the caregiver's behaviour from the early months until two years of age and some of the relationships between the early careviging and the child's later competences are mediated by the interaction with the caregiver. An intervention in the child's early years may potentially produce significant effects upon his cognitive development.

High Risk Infants and Intervention Strategies

a) Intervention Programmes

Research in the area of child development has often suggested that different early rearing conditions that are associated with various levels and types of caregiver-intant interaction are capable of influencing a wide range of developing behaviour. The effects of early experience on visually directed reaching (White and Held, 1967), crawling and walking (Dennis and Najarian, 1957) and independence in adulthood (Skeels, 1966) have specifically been noted. In particular, infants experiencing prenatal and pernatal hazards and subsequent poor caretaking experiences have been cited as being particularly vulnerable to deficits and delay in later life. However, according to Braine, Heimer, Wortis and Freedman (1966), Drillen (1964), Weiner, Rider and Appel (1963), this vulnerability may be attenuated by careful and suitably organzied environmental conditions. That is, it is the dimensions of the caregiver behaviour that are responsible, in part, for the developmental outcome of the child. However, it must be acknowledged that although there is a correlation between socio-economic class and I.Q., poverty is not analogous to stimulus deprivation.

Support for this new perspective came regularly. For example, in a study conducted by Robinson and Robinson

(1971) it was found that infants and toddlers attending a day care and stimulation programme for two years performed better on the Bayley Scales of Infant Development than did the home reared controls. Furthermore, over the course of two decades many attempts at intervention programmes were initiated based on the previously outlined principles. One popular programme was the DARCEE Infant Programme. Basically, it was a parent-oriented research project conducted at the Demonstration and Research Centre for Early Education of the J. F. K. Centre for Research on Education and Human Development at George Peabody College (Gray, 1977). The goal of the project was to enable parents to become more effective educational change agents and to instruct them in the importance of taking the initiative in planning for the child. The training was designed, as well, to help parents develop better coping skills. Results on the Bayley Test of Infant Development, the Stanford-Binet test, the Gilmore Basic Concept Test and Caldwell HOME Inventory were positive in that the children who attended exhibited higher developmental scores than did a control group.

Another study showing positive effects was the Ypsilanti Infant Education Programme (Lambie, Bond and Weikart, 1974). Following the Piagetian model, this programme was established to assist parents in realizing their individual potential as teachers of their children.

The Milwaukee Model (Heber and Gerber, 1975) used family intervention in order to prevent cultural familial mental retardation. The goal established of this programme was to forestall developmental deficiencies characteristic of the disadvantaged child by training mothers to be the primary intervention agents. They followed the development of the children from the age of three months until they turned six years old. The results tended to suggest that the I.Q. and verbal measures of the experimental children as well as of their siblings were higher than those in the control group.

The Houston Model encouraged parental behaviour that was thought to improve cognitive abilities, self esteem and emotional adjustment (Beller, 1979). Because of the theoretical supposition that the home provides an important learning environment, the programme was conducted there. The New Orleans Model also acknowledge the importance of the home situation and thus, although it was centre-based, it too incorporated home visits into the programme (Beller, 1976). This latter programme was created to educate parents as to the developmental process and thereby change their attitudes toward their children and child-rearing practices. The programme attempted to develop parental capacities as teachers in order to ensure that they play a more active role in arranging their child's environment.

The aim was to increase the social, emotional and intellectual development of the child. Thus, the programme had the dual components of child development and parent development. The teaching techniques used with the mothers encompassed modelling, demonstration and role playing during a parent-child laboratory, group discussion and direct teaching during a lecture session. The children entered the programme when they were two months and remained for two years. Whereas the results of the Houston Model showed greater intellectual gains for the children in the study than for a control group, the results of the more comprehensive New Orleans Model were even more impressive. In particular, compared to a control group, there was greater sensitivity and more positive attitudes in the involved mothers; they used more elaborate language, affection and positive reinforcement, and the children exhibited higher sensorimotor competence on the Uzgiris-Hunt scales and the Bayley test.

The Birmingham Model, another centre-based programme followed children from the age of six months to thirty-six months (Beller, 1979). Once again, the established goal was to increase the mother's active participation in the mothering role and to increase the facilitation of the child's use of materials. An attempt was made to change maternal attitudes and competencies and to increase

communication, planning and social interaction skills. The programme was highly structured in that the emphasis changed with the age of the child. For the youngest group (the six month old babies), the focus was placed on strengthening the attachment between mother and child and enabling the infant to explore stimuli. For the six to twelve month old children, experience with older children was included. At twelve months of age the child was separated from his mother in order to increase his responsiveness to the environment, to improve his manipulation skills and his verbal control. The oldest children (twelve through thirty-six months) were taught by other mothers. Results of this programme show an even better increase in the experimental children than had been previously expected. That is, the children illustrated more exploratory and interaction behaviour and more vocalizing and smiling. They exhibited a longer duration of play and more age-appropriate attachment in separation behaviour. Specifically, they had greater tolerance of brief separations. Thus, early intervention programmes appear to have beneficial effects. An interesting result of these programmes mentioned briefly earlier is that often positive effects extended beyond the subjects involved. Specifically the phenomenon of "vertical" diffusion to siblings and "horizontal" diffusion to neighbours of the benefits of these types of programmes were noted (Klaus and Gray, 1968).

The success of so many models of intervention on various populations of children naturally leads to the question of whether similar results can be achieved with all types of children.

b) High Risk Children

Encouragement for the development of early approaches to intervention for high risk children comes from the growing appreciation of the noted plasticity of the centre nervous system during infancy and early childhood, the beneficial effects of early stimulation on developing animals and humans and the reports of the positive effects of early intervention programmes that have already been established. As mentioned previously, intervention efforts seem to point to the mother-child interaction system as the primary source responsible for producing lasting developmental gains.

Up until the present, clear evidence of delay or disorder has been used as the basis for initiating intervention. Thus, most programmes have been compensatory in nature. The indicators of prospective disorders exist in both medical and social factors which contribute to risk for faulty development. Three types of vulnerable infants can be identified which can be regarded as in need of special early intervention to ensure their optimal

cognitive development and life adjustment (Tjossem, 1976). They include:

(a) Established risk infants whose early appearing aberrant development is related to diagnosed medical disorders which bear certain expectancies for developmental outcome within a specified range of developmental delay.

(b) Environmental risk infants are those biologically normal infants who experience limited maternal and family care, health care, and physical and social stimulation. Without corrective intervention, these conditions impart a high probability for delayed development.

(c) Biological risk infants are those who possess a history of prenatal, perinatal, neonatal and/or early developmental trauma that has resulted in biological insult to the developing nervous system which thereby increases the probability of later appearing aberrant development (Tjossem, 1976, p.5).

These categories are not mutually exclusive and often elements from all three categories interact to produce developmental delay. For example, there exists the situation of biologically vulnerable premature and low birth weight infants born to adolescent mothers who, themselves,

live in poverty (Tjossem, 1976). The interactions of environmental and biological risk factors that act to limit the development of these infants are indeed pervasive. That is, once they possess an early developmental disability they often obtain various interaction patterns that systematically act to diminish the child's developmental potential and opportunities for normal life experiences. Intervention strategies designed to prevent or ameliorate enduring developmental deficits in high risk children involve manipulation of the infant's early experience with an understanding of his needs and response capabilities. It is thought that such an adapted stimulus environment which, by its very nature, creates a well suited learning environment, leads ultimately to improved functional levels of cognitive and adaptive behaviour for many high risk children. However, it is still necessary to determine whether the underlying processes of central importance for intellectual functioning, including motivation and socialization processes, have been so fundamentally changed that the effects of the intervention will endure. It is hoped that in the long run, longitudinal research in this area will provide information that is essential for both the prediction of intellectual deficit and aid in the development of the most efficient methods of ameliorating intellectual delay or deficit.

One research programme carried out by Scarr-Salapatek and Williams (1973) attempted to determine whether there were positive effects of early stimulation on low-birth-weight infants. Noting that such infants born to impoverished mothers are at a double disadvantage, that is, that their biological vulnerability and poor social circumstances interact, they instituted a stimulation programme in order to enhance sensorimotor development (which in turn increases intellectual performance) in the high-risk infant's first year of life. Thirty consecutively born low-birth-weight infants (weighing less than 1,800 grams) were alternately assigned to experimental and control groups. The former group received visual, tactile and kinaesthetic stimulation during its six week stay in the nursery, following which weekly home visits to improve maternal care were made until the infants reached twelve months of age. Results revealed that newborn tests at four weeks and Cattell I.Q. scores at one year showed greater developmental progress for the experimental group than for the control group. Furthermore, in the nursery period, the newborns in the experimental period were observed to be engaging in "looking" behaviour that is otherwise not present for the three pound infant. That is, these babies seemed capable of benefitting from the increased amount of stimulation. Since premature infants are often treated as

extra-uterine fetuses, not much stimulation is offered to them in the typical hospital nursery.

Thus, the early stimulation programme provided for low-birth-weight disadvantaged infants was shown to be effective in promoting behavioural development. However, unless parents are educated in stimulating child care, the effects may only be observed in the short run. Therefore, the authors conclude that knowledge of both child development principles and the importance of stimulating maternal care should be imparted to the expectant mother.

Other studies using premature infants (Bernard, 1976; Beckwith, Cohen, Kopp and Parmalee, 1976; Kass, Sigman, Bromwich and Parmalee, 1976; Rice, 1977; Ross and Leavitt, 1976) found that early intervention may prevent a compounding of problems when the environment can't adjust appropriately to the infant at risk (Brazelton, 1976). In particular, premature infants appear to be less able to compensate for disorganized and/or depriving environments. Compounding the problem, the mother often feels guilty and suffers from a grief reaction over the loss of a perfect child (Brazelton, 1976). Thus, stimulation not only tends to prevent developmental disabilities associated with prematurity (that is, stimulated infants tend to perform at higher levels than control-group infants on measures of sensorimotor and motor development) (Cornell and Gottried, 1976; Rice, 1977)

but also, stimulation programmes provide the mothers with needed support structures. The present nature of early care for the premature infant does not include adequate environmental stimulation (Scarr-Salapatek and Williams, 1973). As a result, a distinction must be made between compensation for environmental deprivation and extra early stimulation. The intervention regarding the former situation involves creating an optimal environment for the mother and infant. It usually involves including parents in the caregiving procedures in the neonatal period which usually lead to an increase in attachment behaviour (Klaus and Kennell, 1970). The latter situation is that described in the Scarr-Salapatek and Williams study. In both cases, stimulation is considered beneficial. Results of these and other programmes (Williams, 1977 & Chestnut, 1977) indicate that although it is true that only certain groups of children are likely to benefit from such large scale programmes (developmental progress is related to organic damage and degree of intellectual handicap), the majority of infants exhibiting increases in their developmental rate have mothers who rate highly in terms of parent-child interaction. Thus, if nothing else, successful programmes of this nature appear to be reducing the fear and anxieties of the parents involved. They become cognizant of the multidimensional aspects of their child's funtions, they become more sensitive observers

of their child's actions and reaction, their involvement in intervention gives new perspective on the value of appropriate educational materials (such as toys) and they learn to manage and stimulate their children (Gordon and Schwartz, 1976).

A group of high risk children that has been extensively studied is the environmentally disadvantaged group. In order to forestall the developmental retardation that often results due to poverty or institutionalization (Ramey, Cambell and Nicholson, 1976) a deliberate attempt to provide an enriched environment for children is needed (Lally and Honig, 1976). According to Tannenbaum (1969) the amount of stimulation available to a child in his home is a strong indicator of his performance in a centre. At the same time, the stimulation received in a centre builds on home experiences and broadens the difference between children from rich versus sparse home environments. There are subtle connections among children, families and intervention programmes that plan to fill the child with needed experiences, information and values. Therefore, there is the need for a co-ordinated effort between parents and programmes in order to provide the appropriate life space for the child. Efforts have involved the teaching of mothers (individually or in groups), a variety of games which can then be played in the home to aid

infant and toddler learning (Badger, 1977; Lambie et al. 1975; Ramey et al. 1976). These programmes focussed rather intensively on the cognitive aspects of toys, games and tasks in order to supply a strong intellectual base. Furthermore, these interventions pronounce the prominent effect of active intellectual and affectionate interactions of adults with infants in optimizing child competence by three years of age (Watts, Barnett and Hafar, 1973). Thus, the services must supply cognitive information along with a supportive environment where parents can feel better about themselves and can see themselves in positions of responsibility and pride with regard to the education of their young children (Lally and Honig, 1975). It is important to note at this time that infants need not advance along all developmental levels simultaneously and that the kinds of experience encountered determine the branch along which advancement does occur (Hunt et al. 1976).

The Parent-Child Development Centre (Johnson, 1975) conducts a programme with Mexican Americans incorporating these aforementioned suppositions. The goal of the centre is to help parents to become effective teachers of their own children and to continue in this role from infancy through the school years. There is an interesting principle, however, that is incorporated into this programme.

The "problem of match" (Hunt, 1961) plays a significant role. That is, it is often difficult to match task complexity and child readiness. On the other hand, some researchers believe many mothers are usually a (or the) most subtle observer of her child and often has a good intuitive grasp of his readiness to learn. Therefore, a major principle of the programme is that the teachers demonstrate an activity, the mother practices that activity, following which the teachers provide feedback to the mother. The end point is the mother adapting the activity to suit herself and her child. Since one of the greatest problems in education is to provide training that generalizes from one instructional setting to broader life experiences (Johnson, 1975), the settings of training are varied and the principles underlying the skills are presented. The latter instruction is provided since mothers appear to be better able to generalize from one situation to another if they have some understanding of the reasons underlying a particular acitivty.

Results of these efforts indicate significant improvements for the children involved in the programme (over control children not in the programme) on the Bayley Mental Development Index. Furthermore, programme mothers were found to be warmer, less intrusive and more sensitively responsive to their children than are controls in videotaped

structured mother-child interactions. Finally, programme homes have more play materials present and have more maternal involvement with the child. These results have importance since, according to Bronfenbrenner (1975), effective intervention programmes of this nature work toward child competence in school through the parent-child system and improves the health conditions and general emotional stability of disadvantaged families.

The intervention programmes mentioned in the foregoing section were discussed in detail to lend insight into the current state of the research in this area. Because of the many positive findings the area is ripe for future considerations. By incorporating many of the outlined principles and practical considerations instant stimulation/parent education programmes can prove successful as a means of intervening in the caregiving process and, thereby, facilitating the cognitive development of babies.

A Programme Example

During the latter part of 1972, the Cincinnati Maternal and Infant Care Project initiated a comprehensive intervention programme for high-risk, adolescent mothers and their infants (Badger, 1977). The project was service-oriented and preventive in nature. Intervention began at birth and emphasized medical and nutritional services as

well as improved family style through training with the mother.

The experimental design included a total of forty-eight socially disadvantaged mother-infant pairs recruited during the post-partum period and were randomly assigned to either class or home visiting treatment groups. All infants were first born, gestationally mature and were matched with respect to age and sex. The educational intervention programme continued until the infants were eighteen months old. "Old" mother (eighteen years or older) and young mothers (sixteen years and younger) met separately. Various professionals such as doctors, nurses and social workers were consistently available for consultation. The major intent of these sessions was to stimulate the development of infants by supporting and extending the mother's role as primary teacher (Badger, 1977). The control group received the services of a nurse or social worker. During the monthly home visits, infant development was assessed and various health and nutrition problems were discussed, however, no aspect of the infant stimulation programme was offered.

The Cincinnati Programme was initiated since there had been some concern regarding the feasibility of initiating intervention during the first year of life. A mother training model had introduced the mutually reinforcing

nature of health, nutrition and educational intervention along with the importance of early maternal-infant attachment in order to maximize the potential of all infants, especially high-risk ones. Thus, in this study the intervention for the "class" mother-infant pairs (i.e. the experimental group) provided the opportunity for new mothers to experience satisfaction in their new roles in that they learned to foster the sensorimotor, cognitive and language development of their babies through a curriculum that matched the developmental levels with sequenced skills. Besides developing the mother's self-esteem in their primary role as teachers, the programme provided a setting where personal problems could be openly discussed. Finally, comprehensive health care replaced crisis oriented medical treatment as the mothers' awareness of the health, nutritional and psychological needs of their children increased.

In the mothers' training model, mothers were led to understand that how they interact with their infants affects them as they grow older. They were encouraged to respond to vocalizations along with other behavioural indicators with interest as their infants played. They were also taught a sequence of infant development skills which enabled them to choose appropriate materials for stimulating their child's development. The group leader served both as

a resource person and a mother model. Furthermore, group pressure provided a valuable motivating force to initiate stimulation. Mothers who were adept infant stimulators were often imitated as well.

During the first few months, the mothers were alerted to the individual differences in infants and to the importance of responding promptly to the needs of their infants. In this way, they were told, infant attachment develops as the babies learn that their mothers can be trusted to answer their needs. They then develop greater confidence in mastering their environment. The mothers learned that their infants' reflexive behaviour could be incorporated in and adapted to learned social and manipulative skills. For example, as a preface to visually-directed reaching and the grasping of objects near the midline of the body, infants begin to notice and study their hands. To encourage this behaviour, each mother is provided with small bells to attach to elastic bands and place on her baby's wrists. Babies wave their arms more in order to produce the tinkling sound of the bells. In the process, eyes connect with hands. About this time, mothers are given long-handled rattles to offer their babies. If the mother touches baby's hand with the rattle as she offers it, he will find it easier to open his fist and grasp the rattle. Coincidental with the infant's earliest success in purposeful

grasping of an object comes his purposeful shaking of a rattle. In terms of cause and effect behaviour or cognitive development, he has come to understand that if he shakes the rattle, he can produce sounds (Badger, 1977, p.51).

When the infants were between three to six months, mothers learned that the babies want new and novel experience and thus develop in relation to the variety of sensory input that they receive. For example, something to look at becomes something to touch, whereas something to hold becomes something to mouth. Therefore, they were encouraged to adapt household items as instruments of activity for their babies. Between six and twelve months of age, the infants increased their activity. The physical arrangement of the classroom changed providing an ever-changing array of materials in order to stimulate the development of the infants examining behaviour, fine manipulation co-ordination, tactile awareness, release of objects in relation to a target, socialization and imitative learning (Badger, 1977, p.53). At this time too, infant-infant interaction became part of the teaching-learning format in the classroom. During the infant developmental period from twelve to eighteen months, the mothers learned that the inner force which propels their children from one stage of development to another, is the drive to

become independent, the drive toward mastery of their environment and the drive to fit in socially and to please. The mothers were instructed to satisfy their infants' needs to please and to become part of the social environment by taking time to play with them as they mastered new skills and by rewarding them with their presence as well as with praise.

Results of infant tests at twelve months on the Uzgiris-Hunt Infant Ordinal Scale of Psychological Development and Bayley Infant Scales indicated that infants of young mothers attending weekly classes performed significantly better than infants of young mothers in the home-visited comparison group (in fact, the latter infants had already begun to fall behind). This treatment effect, however, was not noticeable in infants of slightly older and more mature mothers whose infants performed equally well in class and home-visited groups. It was also noted that two sociological variables negatively influenced infant performance. That is, infants of mothers living alone performed less well than infants of mothers living within extended families or with a husband. Secondly, infants of mothers categorized as having multiple problems performed less well than infants of mothers who were not so described.

Although this programme was only a pilot study, results suggest that the mother-infants group approach

incorporating special class and stimulation techniques is effective, especially with high risk, adolescent mothers. Furthermore, the postpartum period appears to be the optimal recruitment time.

Replication of this type of study (although with a different population), using similar stimulation and classroom approached appears desirable. Finally, the infant development tests used to assess the children in this study seem to be sensitive enough to recognize the cognitive gains made by the children.

Conclusion

In conclusion, the stimulation and intervention programmes dealing with high risk children lend a great deal of insight as to the malleability of the child's cognitive level and his susceptibility to both his environment in general and the mother-child interaction he experiences in particular. The question remains, however, as to the importance of programmes of this nature with respect to physically and mentally normal infants living in middle class environments. In particular, noting the success of the stimulation intervention programmes mentioned it is interesting to determine whether normal infants can enhance development. Because of the battery of tests used in the various studies reported it becomes important to note which infant developmental test (if any) is in fact

sensitive enough to pick out cognitive gains. Many successful intervention programmes appear based on the assumption about parents that "Progressivism" purports:

(a) that parents need expert knowledge and training in infant education,

(b) that parents can run effective programmes, and

(c) that parents and educators can be resources for each other (Lambie et al, 1975).

The overall supposition is that all mothers have the potential to raise competent children and that stimulation programmes can be designed to support mothers into realizing this potential. Thus programmes that are designed to assist mothers gain a better understanding of developmental processes and to involve them as co-equals with teachers in evolving goals for their children are beneficial. Individualization, (the establishment of specific goals) help make it meaningful to each mother and compatible with both her own and her child's personal needs and preferences. Finally, the continued motivation and attendance of mothers is of critical importance.

When examining the literature in the area of infant stimulation, it appears that many questions have been left unanswered. For example, which children receive the most benefit from which types of programmes? How specific should the guidelines and instructions be to the mothers? Furthermore, can developmental accelerations of children in

intervention programmes be picked up accurately via infant assessment measures? These questions became the foci of the present study.

CHAPTER III

RESEARCH DESIGN

PRINCIPLE AIMS

The principle aims of this study, following from the introduction, are to develop an infant-stimulation, parent-education programme which can facilitate individual development and award parents for their care-taking efforts in a positive manner. Another aim is to determine whether certain developmental tests are sensitive enough to pick up developmental gains. Positive results were expected with respect to these hypotheses as a result of previous work in the area of infant development and its relationship to the experiences of early maternal practices and stimulation on children.

A second line of query is to determine whether the nature of the intervention programme (structured versus non-structured) or length of time (twenty-two sessions versus eleven sessions) affect the results. Again, research in the area suggests that these two factors may be of significant importance.

METHOD

SUBJECTS

The study initially contained eighty subjects (twenty per group) but through attrition, the number decreased. The infants who participated in this study were all between the chronological ages of 2 - 15 months at the time of the preliminary testing session and exhibited no known cognitive or physical abnormalities. Three of the children were premature infants. Although it was not a necessary criterion, all the babies were members of white, middle class backgrounds in the Montreal area. The mothers of the children were all highly motivated as exemplified by the fact that they sought out the programme of their own accord, and those who registered in the actual programme experimental groups paid a tuition fee.

The mean ages of the children varied for each of the four groups involved in the study. The two twenty-two session groups contained children of an average of 7.6 months. The eleven session group of children was older, being approximately 2.0 months. The children in the control group fell into a middle age range, being an average of 8.2 months (refer to Table 7 for exact means). The mothers were mostly young (mean age of about 30 years) and, thus, had only one child to care for, although there were several who were in their mid-thirties or older and/or did tend to other children at home.

By the end of the programme, the Structured Twenty-two Session group included seventeen mother-child dyads. The Unstructured Twenty-two Session group included sixteen mother-child pairs. The Structured Eleven Session group and the control group were composed of thirteen and eleven mother-infant dyads respectively.

TREATMENT

The McGill University Ready-Set-Go Infant-Child Parent Programme is an infant-stimulation/parent-education programme designed to enhance the development of infant cognitive competencies. Using Research, Service and Training as its basic tenets, its goals encompassed a wide spectrum in the field of child psychology. Primarily, the intervention programme consisted of a two-and-one-half hour time schedule. The first hour was devoted to infant stimulation, at which time mothers, through the aid of a comprehensive staff (psychologists, pediatricians, speech therapist, audiologist, occupational therapist, child care workers acting as teachers, models and resource personnel) provided their offspring with exercises and activities designed to facilitate cognitive, language, fine motor and gross motor development. Mother-child dyads were often divided into smaller groups, thereby allowing the staff to concentrate more closely on specific age groups. Questions were often asked and discussion sessions often accompanied the activities.

The second hour of the programme was devoted to parent education in a classroom-type seminar in which mothers (after having left their chidlren with child care workers) participated. Here, they experienced the 'educational' component of the intervention. A nutritionist and pediatrician, as well as the other staff members mentioned previously, offered lectures in their various areas of expertise. Video equipment, overhead projections and other audio-visual techniques were often used. Team teaching, group discussions and specific lectures were incorporated. Each mother received an elaborate handbook of readings dealing with relevant areas of child development. Topics in the curriculum included cognitive development (focussing on behavioural sequencing, the object concept, initiation, manipulation, quantitave thought, aspects of Piagetian developmental theory), motor development (stressing the relevance of toys, play materials and equipment and their age appropriateness), language development (outlining the mechanisms of the way in which children learn to talk and the stages of language acquisition), nutrition and its relevance to cognitive development, and behaviour modification.

The final half hour of the programme was allotted for individual consultation at which time, mothers experiencing problems with their offspring were approached. An important element of the programme was the opportunity for the mothers to share the experiences they encountered with others in similar situations. A fourth component of the programme not previ-

ously mentioned was the inclusion of several parent evenings in which both mothers and fathers of the children attended. The curriculum was similar to that previously outlined and was also presented in a classroom fashion. This aspect of the intervention afforded the fathers an apportunity to participate in the parenting programme.

The design of the study incorporated a two-by-two matrix incorporating total time involved in the programme, and nature of the curriculum. The time element was based either on a twenty-two week consecutive session programme or an eleven session, alternate week programme. The nature of the programme was based on either a structured (behavioural) or unstructured (eclectic) approach.

Upon admission into the programme the children were randomly assigned to one of three experimental (intervention) groups or to a control group. The specific conditions of each were:

(A) Structured Twenty-two Sessions. In this group, the seventeen mothers and babies experienced a one-hour session in which they were instructed by a psychologist, occupational therapist and/or speech therapist and had an opportunity to work together. That is, the professional involved would describe the child's development in a particular area, following which an exercise would be modelled. The mothers would then actively engage their children.

in the activity. Supervision and explanation was carefully provided. To ensure that all participants received the information, the group was often divided into smaller sub-groups according to the age of the children. Following this part of the programme, the mothers left their children and attended a one-hour lecture dealing with a relevant area of child development. The curriculum for this part of the programme was carefully prepared in advance. Mothers were taught specific, predetermined lessons and were then given a homework assignment to apply to their own children. Each subject was dealt with for two consecutive weeks. In the second week, the formal lecture was replaced by a practical workshop. A handbook and assorted readings were distributed to the mothers.

(Refer to Appendix)

Opportunity for individual private consultation presented itself following the lecture. This treatment group also experienced the benefits of six parent education evenings to which fathers were also invited.

(B) Unstructured Twenty-two Sessions. This treatment condition was similar to the structured twenty-two session (A) except that the sixteen parents involved indicated the topics they wished to deal with in the lecture hour (there-

fore, the curriculum was not as rigidly preset). In addition, the mothers received no homework assignment and no workshops were included. The teams included the same personnel.

(C) Structured Eleven Sessions. This treatment differed from the others in that the thirteen mothers and infants attended this programme every second week as opposed to every week as in conditions (A) and (B). Thus, they received no workshop sessions, had half the number of sessions and only three parent evenings were scheduled for them. However, the duration of all treatment remained constant (September - April).

It is important to note at this time that the design of the programme has a flaw in that one cell from the two-by-two format was not included. Specifically there was no unstructured, eleven session programme. Hence, the design was not appropriately counterbalanced. This could not be controlled far due to the elaborate parameters of the existing service programme and the resources (both in time and personnel) available in the Ready-Set-Go Programme.

(D) Control Group. This group of eleven children received no programme other than the developmental testing.

The entire programme ran for a total of eight months.

There was a one-month midterm winter break. For the twenty-two session groups (Groups A and B) eleven sessions occurred before the break and eleven occurred after it. For the eleven session group (Group C), five sessions occurred before the break, while six occurred following it. All parent evenings took place following the break.

TESTS

Following the work of Badger (1977), Bradley and Caldwell (1976), Chestnut (1977), Fields et al. (1978), Wach (1973), Wach, Uzgiris and Hunt (1971), the developmental measures selected for this study include the Bayley Infant Mental Developmental Index (Bayley, 1969), the Uzgiris-Hunt Ordinal Scales of Psychological Development (Uzgiris and Hunt, 1975) used for the assessment of Piagetian stages of sensori-motor development and the Denver Developmental Screening Test (Frankenburg and Dobbs, 1967).

With respect to the Uzgiris-Hunt Test, each of the subscales that are included within it (eight in total) were administered independently of each other or were analyzed separately. (Please refer to the Results Section for the maximum scores obtainable on each subscale.)

ADMINISTRATION OF INSTRUMENTS

The three tests were administered to all the subjects in random order by a staff of trained examiners. All examiners

of the Bayley and Hunt tests (five in total) were trained by a single researcher according to the appropriate manuals, and were carefully supervised in order to ensure that reliability and validity standards were maintained. The two examiners administering the Denver Developmental Screening Test followed the same rigid standardization. No constraints were established as to the amount of time allotted for the administration of any tests. However, each examiner was instructed that no test session should end before she was certain of the results of each presented item. To avoid problems regarding varying test performances due to interruptions in the child's daily schedule, all the tests were administered randomly during the day, except when fatigue entered. The assessments were separated by three month intervals, thereby resulting in pre-term, mid-term and post-term scores.

The assumptions that are built into this research are that the sample of mothers and children involved are psychologically normal and are experiencing no major detrimental influences in the home; that they are a relatively homogeneous group (all middle class, Caucasian) and that they are all equally as likely to follow the prescriptions of the programme. The developmental tests used for the study are presumed valid and reliable but not predictive in nature. Furthermore, it is assumed that all examiners have equal effects on all the children and that all the groups received equal attention and instruction by the professional team (except for the predetermined areas of study).

CHAPTER IV

- RESULTS

The results of this study will be examined and discussed with respect to the test used for analysis. That is, first of all Bayley results, then Hunt results and, finally, Denver results will be described.

(A) BAYLEY TEST SCORES

Results of the descriptive statistics indicate that males and females did equally well on all developmental tests. Although males initially scored higher than their female counterparts, females gained slightly more in terms of developmental scores by the end of the programme. The Bayley Test for Intellectual Development corrects for age prior to attributing a numerical value (mental developmental index score - MDI) to the child's performance.

Table 1 summarizes the mean MDI and standard deviation scores for all the subjects on the Bayley Mental Scale of Development.

TABLE 1

MEAN MDI SCORES AND
STANDARD DEVIATIONS ON
THE BAYLEY TEST OF MENTAL DEVELOPMENT

GROUP*		s.d.		D.S.		S.D.
1	100.06	9.40	109.06	13.33	118.12	11.25
2	96.69	14.48	102.23	10.60	112.15	14.98
3	101.36	13.48	102.82	11.55	118.12	14.97
4	102.80	11.60	101.82	13.20	106.20	13.48

*Group 1 Structured Twenty-two Sessions,
Group 2 Unstructured Twenty-two Sessions
Group 3 Structured Eleven Sessions
Group 4 Control

As can be seen from Table 1, all the children from all the groups score at an equal and average level during the first testing session with means of 100.06, 96.69, 101.36, and 102.82, for groups one through four respectively. An analysis of variance indicated no significant differences between groups. By the second testing session Group one, the structured twenty-two session group, shows a marked advance over the other three groups (which are obtaining mean scores of approximately 102) with a mean of 109.06. By the end of the programme, both the structured twenty-two session group and the structured eleven session group have the highest mean scores (118.12 and 118.27) respectively with the unstructured twenty-two session group obtaining a score of 112.15. The control group shows the least improvement with a final mean score of 106.27.

In terms of the standard deviations of the groups, Group one has the most homogeneity while Group two shows the most deviation. At mid-term, however, Group two becomes slightly more uniform. By the end of the programme, however, this group once again shows as much deviation as Groups two, three and four (the standard deviations being 14.97, 14.98 and 13.48 respectively). Only Group one still maintains more homogeneity, obtaining a standard deviation of 11.25.

The three groups that actively participated in the programme all show marked gains in terms of mean MDI (mental developmental index) scores from the pre-test to the post-test scores. That is, as can be seen in Table 2, the structured twenty-two session group gains 15.46 points and the structured eleven session group gains 16.91 points.

TABLE 2

MEAN DIFFERENCES BETWEEN TESTING SESSIONS ON THE BAYLEY TEST OF MENTAL DEVELOPMENT

	TESTING SESSION		
Group*	T2-T1	T3-T2	T3-T1
1	9.00	9.06	18.46
2	5.54	9.92	15.46
3	0.46	15.35	16.91
4	1.00	4.45	3.45

*Group 1 Structured Twenty-two Sessions
Group 2 Unstructured Twenty-Two Sessions
Group 3 Structured Eleven Sessions
Group 4 Control

The control group, not having had the experiences of the stimulation, education and attention of the staff, however, gains only 3.45 points over the nine month span of the programme. Although Group one gains virtually

the same amount between the first and second testing sessions and second and third testing sessions, the other three groups exhibit more gains between the latter two testing periods. In particular, Group three (the structured, eleven session group) appears to have minimal improvement between the pre and mid-term tests (0.46 points) but then escalates 15.35 points between the mid and post-test sessions.

The results of the analyses of variance follow in a similar pattern. When the dependent variable is 'testing session' it is clear that there are no significant differences across groups over all three experimental groups, although the results of the third testing are approaching significance. F ratios for testing sessions one, two and three are $F(1,3) = 0.61$, $F(1,3) = 0.06$ and $F(1,3) = 2.65$ respectively, $p > .05$ in all cases.

When the dependent variable is 'difference score' on an analysis of variance, the results are different. When D_1 (the difference between the scores on the first two testing sessions) and D_2 (the difference between the second and third testing session) are examined, there are no significant differences ($F(1,3) = 0.17$, $p > .05$ and $F(1,3) = 2.55$, $p > .05$ respectively). However, the difference between the first and final testing session (D_3)

is statistically significant with $F(1,3) = 4.24$, $p < .05$. These results are summarized in Tables 3 and 4.

The analysis of variance with respect to the different groups indicates the success of the programme. Groups one, two and three (the structured twenty-two session group, the unstructured twenty-two session group and the structured eleven session group) all have significant F-values as can be seen in Table 5. Group four (the control group) has a non-significant F-value of .37, indicating that this group achieved no statistically significant differences over the course of the year. However, it is important to note that the members of this group still remain within the normal range of development.

TABLE 3

ANALYSIS OF VARIANCE WITH 'TESTING SESSION' AS THE DEPENDENT VARIABLE ON THE BAYLEY TEST OF MENTAL DEVELOPMENT

Source	df	Mean Squares	F	p.
*TS_1	1	89.03	0.61	.44
TS_2	1	8.81	0.06	.81
TS_3	1	501.43	2.65	.11

*TS Testing Session

TABLE 4

ANALYSIS OF VARIANCE OF 'DIFFERENCE SCORES'
ACROSS ALL FOUR GROUPS ON
THE BAYLEY TEST OF MENTAL DEVELOPMENT

Source	df	Mean Squares	F	p
T_2-T_1	1	41.83	0.17	.68
T_3-T_2	1	643.14	2.55	.12
T_3-T_1	1	1,013.02	4.24	.04

TABLE 5

ANALYSIS OF VARIANCE BY GROUPS
OVER TESTING SESSIONS ON
THE BAYLEY TEST OF MENTAL DEVELOPMENT

Source	df	Mean Squares	F	p
*Group 1	2	1,386.02	10.59	.0002
Group 2	2	797.67	4.38	.02
Group 3	2	965.94	5.37	.01
Group 4	2	60.09	0.37	.70

*Group 1 Structured Twenty-two Sessions
Group 2 Unstructured Twenty-two Sessions
Group 3 Structured Eleven Sessions
Group 4 Control

(B) UZGIRIS/HUNT TEST SCORES

The results of the Uzgiris-Hunt Ordinal Scales of Psychological Development can be examined both in terms of total scores of the test as a whole and in terms of scale scores in order to determine where advances, if any, are occuring. Looking first at total scores (Table 6) it appears that during the pre-test session all four groups obtain approximately equal total scores with Group three showing a slight non-significant developmental advancement (the mean scores being 24.28, 25.23, 30.27, 27.73 for groups one through four respectively). The maximum possible total score is 67. During the second testing session the structured twenty-two session group shows a slightly higher mean total score than the other three groups. By the end of the year, the three programme groups all demonstrate higher scores than the control group, with Group three obtaining the highest mean score of 58.00, Group one scoring 56.65 and Group two scoring 51.00. The control group obtains a mean of 45.27. In terms of standard deviations, Group one is the most homogeneous while the control group shows the most deviation throughout all three testing sessions.

TABLE 6

TOTAL MEAN SCORES AND STANDARD DEVIATIONS ON THE UZGIRIS/HUNT TEST*

	TESTING SESSION					
	1		2		3	
GROUP **		s.d.		s.d.		s.d.
1	24.88	12.13	39.88	13.50	56.65	10.44
2	25.23	16.74	35.38	18.10	51.00	14.88
3	30.27	13.73	37.64	15.78	58.00	13.77
4	27.73	19.47	35.09	18.27	45.27	15.13

* Uzgiris/Hunt Test will be used as the abbreviated name for the Uzgiris-Hunt Ordinal Scales for Psychological Development.

** Group 1 Structured Twenty-two Sessions
Group 2 Unstructured Twenty-two Sessions
Group 3 Structured Eleven Sessions
Group 4 Control.

The scores in this age related test are expected to improve from testing session to testing session due to the fact that the children increase in age. Table 7 gives the mean ages for the groups at each testing session.

TABLE 7

MEAN AGES FOR ALL GROUPS
ACROSS ALL TESTING SESSIONS ON
THE UZGIRIS/HUNT TEST

	TESTING SESSION		
	1	2	3
Group 1*	7.71	9.59	14.59
Group 2	7.31	9.31	13.77
Group 3	9.09	10.73	15.27
Group 4	8.00	10.91	13.36

*Group 1 Structured Twenty-two Sessions
Group 2 Unstructured Twenty-two Sessions
Group 3 Structured Eleven Sessions
Group 4 Control

Table 8 summarizes the mean gain scores on the Uzgiris/Hunt. It illustrates that from the outset of the programme until its completion, the structured twenty-two session group gains the most (31.77) while the control group gains the least (17.54 points). Group two (unstructured twenty-two session group) gains 25.77 points while Group three (structured eleven session group) gains 27.73 points. Between the first two testing sessions and final two testing sessions, Group

one continuously exhibits the greatest gain scores when compared to the other groups. In general, however, most of these improvements occur between the mid and post-test span. Group three exhibits the largest gains in performance in that from the pre-test to the mid-test session it gains virtually the same number of points as does the control group (7.37 as compared to 7.36). However, from the mid-test to the post-test period, infants in this group gain a substantial 20.36 points. The control group gains only 10.18 points. Groups one and two gain 16.77 and 15.62 points respectively.

It must be noted before proceeding that the scores that have been discussed up until this point are raw performance scores representing total number of items answered correctly and the data presented in the tables thus far for the Uzgiris/Hunt Test are not, as yet, covaried for age.

TABLE 8

MEAN GAIN SCORES ON THE UZGIRIS/HUNT TEST

Testing Session	TS_2-TS_1	TS_3-TS_2	TS_3-TS1
Group 1*	15.00	16.77	31.77
Group 2	10.15	15.62	25.77
Group 3	7.37	20.36	27.73
Group 4	7.36	10.18	17.54

* Group 1 Structured Twenty-two Sessions
Group 2 Unstructured Twenty-two Sessions
Group 3 Structured Eleven Sessions
Group 4 Control Group

The results of the subscales of this test (Tables 9 - 12) indicate where the advances are occuring when, in fact, they are being made. The maximum subscale scores are as follows: 15, 12, 6, 4, 7, 11, 10, 2. On the first scale measuring object permanence and visual pursuit (maximum score being 15) the structured twenty-two session group scores approximately one point below the other three groups at the outset of the programme (the mean being 4.41 as compared to 5.46, 5.36 and 5.55 for the unstructured twenty-two session group, the structured eleven-session group and the control group respectively). However, by the end of the programme it achieves as high a mean score as Group three (12.41 versus 12.45). The unstructured group follows with a mean score of 11.00 while the control group lags behing with a score of 10.00. In terms of gain scores, Group one gains the most between the first two testing sessions when compared to the other groups (3.53 points) while Group two gains the least (0.92 points). However, between the second and third session, Group two makes up this difference by making the most progress (4.62) while the control group begins to show a lag, gaining only 2.45 points. Overall, Group one shows the most gain over the three testing sessions (8.00 points) followed by Groups three (7.09 points), two (5.54 points) and the control group (4.45 points).

On the second scale measuring the development of means for obtaining desired environmental events (maximum score being 12) all the groups start out at approximately the same developmental level (4.29, 4.46, 4.91, 4.91, for Groups one through four respectively). By the final testing session the control group achieves slightly below the other three, obtaining a mean score of 8.64 points as compared to the other three groups (10.35, 9.46 and 10.36 points for Groups one through three respectively). Again, with respect to gain scores, Group one gains the most points over the three testing sessions (6.06 points) while the control group gains the least (3.73 points). Groups two and three gain 5.00 and 5.45 points respectively. While Groups one, two and four gain points consistently between the three testing sessions, Group three gains relatively little between the pre-test and mid-term test but exhibits greater gains than the other three groups between the mid-term and post-testing sessions.

The third scale, which measures imitation, is further divided into two subscales: vocal (maximum score being 6) and gestural (maximum score being 4). On the first subscale (vocal), Group three starts out at a slight advantage over the other three (3.09 points as

compared to 2.47, 2.62 and 2.36 points for Groups one, two and four respectively). By the final testing session, however, again Group one has the highest mean score (4.88) while the control group has the lowest (3.64). Groups two and three fall in the middle with scores of 4.00 and 4.82 respectively. All the groups gain almost nothing between the first two testing sessions. Thus, any advancement that occurs, appears between the mid-term and post-term tests. Group one shows a slight advantage in overall gain scores (2.41 as compared to 1.38, 1.78 and 1.28 for Groups two through four).

With respect to the second subscale (gestural) the results are slightly divergent. Although the control group initially obtains a higher score than the other three groups (1.36 as compared to 0.59, 0.92 and 0.82 for Groups one, two and three) by the final testing session, it is the structured eleven session group that has the advantage. The control group scores the lowest. All three programme groups demonstrate gains between testing sessions (especially between the latter two) while the control group appears to remain constant, the mean scores being 2.65, 2.16, 2.54 and 0.73 points for the four groups respectively.

Scale four measures the development of operational causality and antecedent-consequent relationships (maximum score being 7). Results of this subtest indicate that all groups start out approximately equal, although Group two (the unstructured twenty-two session group) scores slightly below the other three. The post-test scores reveal that Group three achieves the highest final score (6.45) while the control group obtains the lowest (4.36). Groups one and two fall in the middle with scores of 5.82 and 5.23 respectively. The control group begins to lag behind the other three groups by the mid-term. Thus, the control group shows minimal development between testing sessions. Group three gains the most overall (2.81 as compared to 2.17, 2.54 and 0.91 for Groups one, two and four), and shows this development between the latter two testing sessions. On the other hand, Group two has its most marked gains between the two primary testing sessions.

Scale five measure the construction of object relations in space (maximum score being 11). Initially, the groups obtain divergent scores, with Group two scoring lowest, while Group three scores the highest. During the second testing session all the groups become equal,

obtaining about 5.5 points. By the end of the programme, Group three obtains the high score of 9.73 points, followed by Groups one (9.06 points), two (8.00 points) and four (6.91 points). Overall, all the participating groups gained over four points over the course of the programme while the control group gained only 1.36 points. Again, Group three shows very little gain between the first two testing sessions (0.19 points) but the largest gain of all the groups (4.09 points) between the second and third testing sessions.

The sixth and final scale measures the development of schemes for relating objects (maximum score being 12). For this scale, Group three has the initial advantage but by the post-test, the three programme groups score equally (10.82, 10.15 and 10.82 for Groups one, two and three respectively) while the control group scores the lowest. Group one (the structured twenty-two session group) shows the most overall gain (5.64 points) while the control group shows the least. Once again, most of the developmental gains of Group three occur between the latter two testing sessions.

TABLE 9

MEAN TEST SCORES FOR GROUP 1 (STRUCTURED TWENTY-TWO SESSIONS) FOR EACH TESTING SESSION BY SUB-SCALE ON THE UZGIRIS/HUNT TEST

TS	*RS1	RS2	RS3A	RS3B	RS4	RS5	RS6A	RS6B	TOTAL
1	4.41	4.29	2.47	0.59	3.65	4.59	4.47	0.71	24.88
2	7.94	7.69	3.29	1.59	4.94	5.59	6.88	1.71	39.88
3	12.41	10.35	4.88	3.24	5.82	9.06	8.82	2.00	56.65

* = Subscale

TABLE 10

MEAN TEST SCORES FOR GROUP 2 (UNSTRUCTURED TWENTY-TWO SESSIONS) FOR EACH TESTING SESSION BY SUBSCALE ON THE UZGIRIS/HUNT TEST

TS	RS1	RS2	RS3A	RS3B	RS4	RS5	RS6A	RS6B	TOTAL
1	5.46	4.46	2.61	0.92	2.69	3.53	4.61	1.00	25.23
2	6.38	7.15	3.30	1.61	4.46	5.46	5.76	1.61	35.38
3	11.00	9.46	4.00	3.07	5.23	8.00	8.15	2.00	51.00

TABLE 11

MEAN TEST SCORES FOR GROUP 3 (STRUCTURED ELEVEN SESSIONS) FOR EACH TESTING SESSION BY SUBSCALE ON THE UZGIRIS/HUNT TEST

TS	RS1	RS2	RS3A	RS3B	RS4	RS5	RS6A	RS6B	TOTAL
1	5.36	4.90	3.09	0.81	3.63	5.63	5.36	1.36	30.27
2	8.54	6.54	3.09	1.54	4.54	5.45	6.27	1.45	37.64
3	12.45	10.36	4.81	3.36	6.45	9.72	8.90	1.09	58.00

TABLE 12

MEAN TEST SCORES FOR GROUP 4 (CONTROL GROUP) FOR EACH TEST-SESSION BY SUBSCALE ON THE UZGIRIS/HUNT TEST

TS	RS1	RS2	RS3A	RS3B	RS4	RS5	RS6A	RS6B	TOTAL
1	5.54	4.90	2.36	1.36	3.54	4.54	4.27	1.18	27.73
2	7.54	6.72	2.81	1.45	3.63	5.36	6.09	1.45	35.09
3	10.00	8.63	3.63	2.09	4.36	6.90	7.09	1.63	45.27.

Tables 13 through 21 indicate the mean gains between each testing session for all groups and all the subtests.

TABLE 13

MEAN DIFFERENCE SCORES BETWEEN TESTING SESSIONS FOR EACH GROUP AND SUBTEST RS1 OF THE UZGIRIS/ HUNT TEST

Testing Sessions	T_2-T_1	T_3-T_2	T_3-T_1
Group 1	3.53	4.47	8.00
Group 2	1.92	4.62	5.54
Group 3	3.19	3.90	7.09
Group 4	2.00	2.45	4.45

TABLE 14

MEAN DIFFERENCE SCORES BETWEEN TESTING SESSIONS FOR EACH GROUP AND SUBTEST RS2 OF THE UZGIRIS/ HUNT TEST

Testing Sessions	$T_2 - T_1$	$T_3 - T_2$	$T_3 - T_1$
Group 1	3.36	2.70	6.06
Group 2	2.69	2.31	5.00
Group 3	1.64	3.81	5.45
Group 4	1.82	1.91	3.73

TABLE 15

MEAN DIFFERENCE SCORES BETWEEN TESTING SESSIONS FOR EACH GROUP AND SUBTEST RS3A OF THE UZGIRIS/ HUNT TEST

Testing Sessions	$T_2 - T_1$	$T_3 - T_2$	$T_3 - T_1$
Group 1	0.82	1.59	2.41
Group 2	0.69	0.69	1.38
Group 3	0.	1.73	1.73
Group 4	0.46	0.82	1.28

TABLE 16

MEAN DIFFERENCE SCORES BETWEEN TESTING SESSIONS FOR EACH GROUP AND SUBTEST RS3B OF THE UZGIRIS/ HUNT TEST

Testing Session	T_2-T_1	T_3-T_2	T_3-T_1
Group 1	1.00	1.65	2.65
Group 2	0.70	1.46	2.16
Group 3	0.73	1.81	2.54
Group 4	0.09	0.64	0.73

TABLE 17

MEAN DIFFERENCE SCORES BETWEEN TESTING SESSIONS FOR EACH GROUP AND SUBTEST RS4 OF THE UZGIRIS/ HUNT TEST

Testing Sessions	T_2-T_1	T_3-T_2	T_3-T_1
Group 1	1.29	0.88	2.17
Group 2	1.77	0.77	2.54
Group 3	0.91	1.90	2.81
Group 4	0.09	0.72	0.91

TABLE 18

MEAN DIFFERENCE SCORES BETWEEN TESTING SESSIONS FOR EACH GROUP AND SUBTEST RS5 OF THE UZGIRIS/ HUNT TEST

Testing Sessions	T_2-T_1	T_3-T_2	T_3-T_1
Group 1	1.00	3.47	4.47
Group 2	1.15	2.38	3.53
Group 3	0.91	2.64	3.55
Group 4	1.82	1.00	2.82

TABLE 19

MEAN DIFFERENCE SCORES BETWEEN TESTING SESSIONS FOR EACH GROUP AND SUBTEST RS6A OF THE UZGIRIS/ HUNT TEST

Testing Sessions	T_2-T_1	T_3-T_2	T_3-T_1
Group 1	2.41	1.94	4.35
Group 2	1.15	2.38	3.53
Group 3	0.91	2.64	3 55
Group 4	1.82	1.00	2.82

TABLE 20

MEAN DIFFERENCE SCORES BETWEEN TESTING SESSIONS FOR EACH GROUP AND SUBTEST RS6B OF THE UZGIRIS/ HUNT TEST

Testing Sessions	T_2-T_1	T_3-T_2	T_3-T_1
Group 1	1.00	0.29	1.29
Group 2	0.62	0.38	1.00
Group 3	0.09	0.46	0.55
Group 4	0.27	0.19	0.46

TABLE 21

MEAN DIFFERENCE SCORES BETWEEN TESTING SESSIONS FOR EACH GROUP AND SUBTEST RS6(A + B) OF THE UZGIRIS/HUNT TEST

Testing Sessions	T_2-T_1	T_3-T_2	T_3-T_1
Group 1	3.41	2.23	5.64
Group 2	1.77	2.76	4.53
Group 3	1.00	3.10	4.10
Group 4	2.09	1.19	3.28

Group 1 Structured Twenty-two Sessions
Group 2 Unstructured Twenty-two Sessions
Group 3 Structured Eleven Sessions
Group 4 Control

The results of analyses of variance indicate that during the first testing session, across all groups, none of the subtests nor the total score reaches significance. That is, all groups start out on all subscales equally. At the second testing session, however, RS_2, RS_4, RS6A and the total scores, do reach significance ($p < .05$) (that is, there is a difference between groups) obtaining F values of $F(3,24) = 3.52$, $F(3,24) = 3.66$, $F(3,24) = 3.07$ and $F(3,24) = 4.36$ respectively. By the third testing session, there is no longer any significant difference between groups on RS 2 ($F(3,24) = 1.28$, $p < .05$). On the other hand, RS3B, RS4, RS6A, RS6B and the total score all reach significance with F values of $F(3,24) = 5.20$, $F(3,24) = 4.87$, $F(3,24) = 4.66$, $F(3,24) = 3.08$, $F(3,24) = 5.80$, and $F(3,24) = 3.93$, $p < .05$) respectively (see Table 22 for a complete summary).

TABLE 22

ANALYSIS OF VARIANCE FOR THE THREE TESTING SESSIONS ON ALL THE SUBTESTS ACROSS THE GROUPS ON THE UZGIRIS/HUNT TEST

SOURCE	df	MEAN SQUARE	F	p
TESTING SESSION I				
RS1	3	19.88	1.36	.27
RS2	3	4.43	0.30	.82
RS3A	3	1.63	0.58	.63
RS3B	3	4.85	2.07	.12
RS4	3	5.39	1.22	.31
RS5	3	7.30	2.23	.09
RS6A	3	3.21	0.33	.80
RS6B	3	1.99	1.68	.18
TOTAL	3	35.47	0.28	.84

TABLE 22 (Continued)

SOURCE	df	MEAN SQUARE	F	p
TESTING SESSION 2				
RS1	3	22.18	1.45	.23
RS2	3	36.38	3.52	.02
RS3A	3	6.31	1.58	.20
RS3B	3	2.88	1.00	.40
RS4	3	23.99	3.66	.02
RS5	3	8.38	1.42	.25
RS6A	3	20.24	3.07	.04
RS6B	3	1.57	2.07	12
TOTAL	3	677.76	4.36	.009
TESTING SESSION 3				
RS1	3	12.73	1.06	.37
RS2	3	8.43	1.28	.23
RS3A	3	6.03	2.16	.11
RS3B	3	6.89	5.20	.004
RS4	3	16.09	4.87	.005
RS5	3	24.79	4.66	.006
RS6A	3	10.98	3.08	.04
RS6B	3	0.90	5.80	.002
TOTAL	3	433.38	3.93	.01

At all times, it is the structured, twenty-two session group (Group 1) that is scoring the highest of the four groups, while is is the control group (Group 4) that is performing the lowest.

The results of the analyses of variance determining where the differences between test scores of the different sessions occur indicate that the only difference between the first two testing sessions for the groups appears for RS6B ($F(3,24) = 3.45$, $p < .05$). Between testing sessions two and three, the only statistically significant difference appears

for RS5 ($F(3,24) = 3.56$, $p < .05$), RS3B ($F(3,24) = 7.55$, $p < .05$), RS4 ($F(3,24) = 4.50$, $p < .05$), RS5 ($F(3,24) = 3.44$, $p < .05$), RS6B ($F(3,24) = 3.49$, $p < .05$), and on the total score ($F(3,24) = 6.52$, $p < .05$). Table 23 summarizes the results of the analyses of variance of the differences between testing sessions.

TABLE 23

ANALYSIS OF VARIANCE OF THE DIFFERENCE IN SCORES BETWEEN TESTING SESSIONS ON THE SUBTESTS ACROSS ALL GROUPS ON THE UZGIRIS/HUNT TEST

	SOURCE	df	MEAN SQUARE	F	p
T_2-T_1	RS1	3	53.41	2.48	.07
	RS2	3	25.78	1.36	.27
	RS3A	3	4.94	0.92	.44
	RS3B	3	5.81	1.08	.37
	RS4	3	17.44	1.99	.13
	RS5	3	21.65	2.22	.10
	RS6A	3	20.58	1.53	.22
	RS6B	3	5.99	3.45	.02
	TOTAL	3	572.99	2.48	.07
T_3-T_2	RS1	3	31.04	1.34	.27
	RS2	3	25.11	1.70	.18
	RS3A	3	10.42	1.81	.16
	RS3B	3	8.51	2.05	.12
	RS4	3	14.28	1.44	.24
	RS5	3	47.17	3.56	.02
	RS6A	3	15.13	1.78	.16
	RS6B	3	0.49	0.50	.68
	TOTAL	3	567.73	2.48	.07
T_3-T_1	RS1	3	99.07	4.10	.01
	RS2	3	38.42	2.16	.10
	RS3A	3	11.72	1.83	.15
	RS3B	3	28.10	7.55	.003
	RS4	3	28.69	4.50	.007
	RS5	3	34.69	3.44	.02
	RS6A	3	15.65	1.37	.26
	RS6B	3	4.97	3.49	.02
	TOTAL	3	1,378.08	6.52	.009

Results of analyses of variance for each group separately across testing sessions (each being co-varied for age) for each of the subtests and totals of the test (Table 24) reveal that whereas Group 1, the structured twenty-two session group, shows significant gains on many of the subscales (e.g. RS1 ($F(2,16) = 4.25$, $p < .05$), RS2 ($F(2,16) = 5.63$, $p < .05$), RS3B ($F(2,16) = 4.91$, $p < .05$), RS6B ($F(2,16) = 9.87$, $p < .05$) and total score ($F(2,16) = 7.35$, $p < .05$) the control group makes no significant gains on any subtest. Group 2, the unstructured twenty-two session group, and Group 3, the structured eleven session group, each obtain only one significant difference value (for Group 2 it is RS4 ($F(2,16) = 5.39$, $p < .05$) and for Group 3, it is RS5 ($F(2,16) = 4.42$, $p < .05$)). Many of the other F values tend to approach significance although they never do reach the significance levels.

TABLE 24

ANALYSES OF CO-VARIANCE FOR EACH GROUP ACROSS TESTING SESSIONS ON EACH OF THE SUBTESTS OF THE UZGIRIS/HUNT TEST

SOURCE		df	MEAN SQUARE	F	p
GROUP 1	RS1	2	38.61	4.25	.02
	RS2	2	47.37	5.63	.006
	RS3A	2	2.90	1.53	.23
	RS3B	2	6.32	4.91	.01
	RS4	2	8.32	2.22	.12
	RS5	2	5.85	2.08	.14
	RS6A	2	16.85	2.99	.06
	RS6B	2	6.13	9.87	.003
TOTAL		2	689.21	7.35	.002

TABLE 24 (Continued)

SOURCE		df	MEAN SQUARE	F	p
GROUP 2	RS1	2	10.16	1.00	.38
	RS2	2	11.24	2.04	.15
	RS3A	2	3.31	1.69	.20
	RS3B	2	1.51	1.09	.35
	RS4	2	9.71	5.39	.009
	RS5	2	4.60	1.44	.25
	RS6A	2	0.34	1.01	.99
	RS6B	2	1.39	2.63	.09
	TOTAL	2	41.32	0.47	.63
GROUP 3	RS1	2	34.84	2.90	.07
	RS2	2	22.03	2.75	.08
	RS3A	2	1.45	0.69	.51
	RS3B	2	4.47	2.62	.09
	RS4	2	4.87	1.38	.27
	RS5	2	17.58	4.42	.02
	RS6A	2	1.07	0.24	.79
	RS6B	2	0.09	0.17	.85
	TOTAL	2	281.08	2.83	.78
GROUP 4	RS1	2	1.35	0.34	.71
	RS2	2	1.43	0.27	.77
	RS3A	2	0.42	0.16	.85
	RS3B	2	1.71	0.98	.39
	RS4	2	4.54	1.08	.35
	RS5	2	2.33	0.62	.54
	RS6A	2	0.67	0.18	.83
	RS6B	2	0.04	0.12	.89
	TOTAL	2	35.18	0.54	.59

GROUP 1 Structured Twenty-two Sessions
GROUP 2 Unstructured Twenty-two Sessions
GROUP 3 Structured Eleven Sessions
GROUP 4 Control

(C) DENVER TEST SCORES

The results of the Denver Screening Test are not as clear as those of the Bayley and Uzgiris/Hunt tests. Tables 25 through 28 provide the percentage means of passes for the four groups on each of the subtests (personal-social, fine motor, language and gross motor). That is, because of the nature of this screening device, the number of items each child receives on each subtest varies with the age of the child. However, each item is judged on a pass/fail basis. Thus, in order to obtain mean pass scores and thereby make all subjects comparable, the percentage of 'passes' is the score that was considered. The mean derived scores (the derived score being "1" for normal, "2" for questionable and "3" for delayed) are included, although, in the future, the frequency within each discrete category would be more appropriately used. The means ages for groups are noted as well.

With respect to the variables (personal-social, fine motor, language, gross motor) there is very little difference from session to session for any of the groups and, contrary to results on the other tests, the change in the mean percentage scores goes in both positive and negative directions. The derived

scores for all the groups at all times hover around "1", indicating that all the children including those of the control group, fall into the normal range. Finally, in terms of the ages involved at each testing session, all the children appear to be at approximately equal chronological levels, although Group 3 (the structured eleven-week group) is slightly older than the others, while Group 2 (the unstructured twenty-two session group) is the youngest. This fact makes no significant difference since the test is controlled for age.

TABLE 25

MEAN PERCENTAGE SCORES FOR GROUP 1 (THE STRUCTURED TWENTY-TWO SESSIONS) FOR ALL THE TESTING SESSIONS ON PERSONAL-SOCIAL, FINE-MOTOR, LANGUAGE AND GROSS-MOTOR VARIABLES, MEAN DERVIED SCORES AND MEAN AGES ON THE DENVER TEST

TESTING SESSION	PERSONAL -SOCIAL	FINE-MOTOR	LANGUAGE	GROSS-MOTOR	DERIVED SCORE	AGE
1	0.87	0.81	0.89	0.87	1.50	7.38
2	0.90	0.83	0.83	0.73	1.11	9.77
3	0.87	0.86	0.75	0.78	1.11	14.44

TABLE 26

MEAN PERCENTAGE SCORES FOR GROUP 2 (UNSTRUCTURED TWENTY-TWO SESSIONS) FOR ALL TESTING SESSIONS ON PERSONAL-SOCIAL, FINE-MOTOR, LANGUAGE AND GROSS-MOTOR VARIABLES, MEAN DERIVED SCORES AND MEAN AGES ON THE DENVER TEST

TESTING SESSION	PERSONAL -SOCIAL	FINE-MOTOR	LANGUAGE	GROSS-MOTOR	DERIVED SCORE	AGE
1	0.85	0.81	0.87	0.89	1.23	6.61
2	0.95	0.86	0.71	0.79	1.15	9.07
3	0.94	0.85	0.73	0.77	1.00	13.61

TABLE 27

MEAN PERCENTAGE SCORES FOR GROUP 3 (STRUCTURED ELEVEN SESSIONS) FOR ALL TESTING SESSIONS ON PERSONAL-SOCIAL, FINE-MOTOR, LANGUAGE, AND GROSS MOTOR VARIABLES, MEAN DERIVED SCORES AND MEAN AGES ON THE DENVER TEST

TESTING SESSION	PERSONAL -SOCIAL	FINE-MOTOR	LANGUAGE	GROSS-MOTOR	DERIVED SCORE	AGE
1	0.90	0.84	0.88	0.76	1.18	8.72
2	0.87	0.77	0.75	0.77	1.09	10.72
3	0.93	0.90	0.73	0.63	1.18	15.45

TABLE 28

MEAN PERCENTAGE SCORES FOR GROUP 4 (CONTROL GROUP) FOR ALL TESTING SESSIONS ON PERSONAL-SOCIAL, FINE-MOTOR, LANGUAGE AND GROSS-MOTOR VARIABLES, MEAN DERIVED SCORES AND MEAN AGES ON THE DENVER TEST

TESTING SESSION	PERSONAL -SOCIAL	FINE-MOTOR	LANGUAGE	GROSS-MOTOR	DERIVED SCORE	AGE
1	0.85	0.80	0.82	0.83	1.18	7.90
2	0.73	0.91	0.81	0.73	1.00	10.81
3	0.97	0.74	0.74	0.75	1.09	13.36

The results of the analyses of variance for the four groups across testing sessions are summarized in Table 29. Significant changes for language ($F(2,10) = 3.74$, $p < .05$) for Group 1, for the gross-motor score ($F(2,10) = 3.90$, $p < .05$) for Group 2, for the gross-motor score ($F(2,10) = 4.15$, $p < .05$) for Group 3, and for the personal-social ($F(2,10) = 6.76$, $p < .05$) and fine-motor scores ($F(2,10) = 4.12$, $p < .05$ for Group 4, were obtained. There is virtually no meaningful difference between groups on any measure of this screening instrument.

TABLE 29

ANALYSES OF VARIANCE FOR EACH GROUP ACROSS TESTING SESSIONS ON THE PERSONAL-SOCIAL, FINE-MOTOR, LANGUAGE AND GROSS-MOTOR SCORES OF THE DENVER SCREENING TEST

	SOURCE	df	MEAN SQUARE	F	p
GROUP 1 (Structured twenty-two sessions)	Personal-Social	2	0.02	o.53	.59
	Fine-Motor	2	0.01	0.14	.89
	Language	2	0.36	3.74	.03
	Gross-Motor	2	0.18	2.22	.12
GROUP 2 (Unstructured twenty-two sessions)	Personal-Social	2	0.05	1.53	.23
	Fine-Motor	2	0.04	0.92	.41
	Language	2	0.32	2.90	.07
	Gross-Motor	2	0.15	3.90	.02
GROUP 3 (Structured eleven sessions)	Personal-Social	2	0.01	0.39	.68
	Fine-Motor	2	0.54	0.73	.49
	Language	2	0.11	1.15	.33
	Gross-Motor	2	0.53	4.15	.03
GROUP 4 (Control)	Personal-Social	2	0.28	6.76	.004
	Fine Motor	2	0.20	4.12	.03
	Language	2	0.02	0.12	.86
	Gross-Motor	2	0.14	2.44	.11

Table 30 summarizes the results of the analyses of variance at each testing session, collapsing over groups in order to assess whether there is any one of the four variables that is more affected by the programme than any other. The only significant score appears for the personal-social score at the second testing session ($F(3,15) = 8.56$, $p < .05$). There is relatively no change in score from any of the testing sessions to any other of the sessions, the only exceptions being for the personal-social variable that become significant at the second testing session while it was not at the first ($F(3,15) = 3.69$, $p < .05$) and for both the personal-social and fine-motor variables which change significantly from the initial to the final testing sessions ($F(3,15) = 6.45$, $p < .05$) and ($F(3,15) = 2.99$, $p < .05$) respectively. Referring to Table 31, it can be seen that there is no significant change on any variable between the second and third testing sessions.

TABLE 30

ANALYSES OF VARIANCE FOR EACH TESTING SESSION ACROSS GROUPS ON PERSONAL-SOCIAL, FINE-MOTOR, LANGUAGE AND GROSS-MOTOR SCORES OF THE DENVER SCREENING TEST

SOURCE		df	MEAN SQUARE	F	p
TESTING SESSION 1	Personal-Social	3	0.02	0.26	.85
	Fine-Motor	3	0.01	0.12	.95
	Language	3	0.04	0.55	.65
	Gross-Motor	3	0.18	1.86	1.45
TESTING SESSION 2	Personal-Social	3	0.39	8.56	.001
	Fine-Motor	3	0.12	1.48	.23
	Language	3	0.14	0.73	.54
	Gross-Motor	3	0.04	0.40	.75
TESTING SESSION 3	Personal-Social	3	0.08	1.82	.16
	Fine-Motor	3	0.14	1.68	.18
	Language	3	0.01	0.05	.98
	Gross-Motor	3	0.30	2.13	.11

TABLE 31

ANALYSES OF VARIANCE OF THE DIFFERENCES IN PERCENTAGE SCORES BETWEEN TESTING SESSIONS ON THE PERSONAL-SOCIAL, FINE-MOTOR, LANGUAGE AND GROSS-MOTOR SCORES ACROSS GROUPS ON THE DENVER SCREENING TEST

SOURCE		df	MEAN SQUARE	F	p
$T_2 - T_1$	Personal-Social	3	0.38	3.69	.02
	Fine-Motor	3	0.15	0.74	.53
	Language	3	0.18	0.68	.57
	Gross-Motor	3	0.21	1.34	.27
$T_3 - T_2$	Personal-Social	3	0.12	0.91	.44
	Fine-Motor	3	0.12	0.66	.66
	Language	3	0.04	0.14	.94
	Gross-Motor	3	0.03	0.26	.85
$T_3 - T_1$	Personal-Social	3	0.61	6.45	.009
	Fine-Motor	3	0.51	2.99	.04
	Language	3	0.13	0.32	.81
	Gross-Motor	3	0.36	2.14	.11

CHAPTER V

DISCUSSION

When analyzing the results of tests administered to both the children in the intervention programmes and to those in the control group, it appears that those in the former category appear to acquire a distinct developmental advantage. With respect to the Bayley results, for example, although initially all the children perform equally (approximately 100.00) by the completion of the intervention programme the three groups which received the stimulation-education programme score significantly higher than the control group. This differentation begins to appear during the second testing session, especially for the structured twenty-two session group (Group 1). Overall, it

appears that this group benefitted most from the programme when noting a basic mental developmental score such as "MDI".

Prior to the proceeding, it is of fundamental importance to refer once again to the differential aspects of the programme offered to the experimental and control groups. Referring to the methodology section (Chapter III), the research was based upon the following group interventions:

Group 1, the structured twenty-two session group, received twenty-two consecutive weeks of infant-stimulation, parent-education treatment. During the parent classes, the group members were "instructed", were provided with rigid guidelines and techniques as to how to handle their children, were presented with specified topics and were given specific homework assignments that were later collected and graded. Each topic lasted two sessions and six parent evenings were also provided, in which both mothers and fathers participated. These sessions were conducted in a similarly rigid and behavioural fashion to the classroom experiences;

Group 2, the unstructured, twenty-two session group,, participated in twenty-two consecutive infant-stimulation, parent-education classes. However, in contrast to Group 1, its

classroom structure was less rigidly defined. That is, in addition to presentations by the lecturer, the mothers assumed an active role in selecting the topics of discussion and in actively participating during the sessions. Homework assignments were not mandatory. In general, the atmosphere was more spontaneous and less structured, although the six parent evenings were similar to those of Group 1;

Group 3, the structured eleven session group, participated in eleven, alternate week sessions. Its programme was rigidly outlined (similar to that of Group 1) and received half the amount of programme time. In addition, only three parent evenings were provided;

Group 4, the control group, experienced no intervention programme whatsoever. Keeping these fundamental differences of the groups in mind, the reader is now able to place the results in perspective.

The desired gain scores are the most revealing part of the analysis in that whereas the programme groups all gained over fifteen points in MDI over the course of the intervention programme (seven months) the control group gained three and a half points. This most probably represents

normal development and is in part due to the attention given to these mother-child dyads by the examiners. One must also consider the possibility of the influence of test retest normal reliability that may well have accounted for observed differences. Interestingly, whenever gains are made, they occur during the latter part of the programme, between the mid-term and post-term testing sessions. Although on the Bayley Test the twenty-two sessions groups (especially the structured one) obtain relatively equal and consistent gains throughout the course of the year, this fact is especially obvious for the structured eleven session group. That is, on most of the tests (including those of the Uzgiris/ Hunt Ordinal Tests of Psychological Development) the children exhibit little or no improvement on the second set of tests when compared to results of the first set, but exhibit a significant improvement on the third set of tests over the previous two. It appears that although twenty-two weekly sessions seem most appropriate to provide the mothers and their children an advantage in obtaining early pronounced benefits, the eleven-session, bi-monthly group takes considerable more time to be affected. It is as if, suddenly, after weeks of participation in the programme, there is sudden insight as to what should be

occurring or that differences on these tests take longer to come about. That is, after a period of weeks of working with the mother-child dyads the mothers suddenly involve themselves more with their children and/or the elements of the programme while the children suddenly accrue the benefits of the intervention programme. Furthermore, it must be noted that there is a chronologically longer time span between the latter two testing sessions than between the former two, which might account partially for this increase in development. Finally, it may well be, especially for the bi-monthly group, that it takes approximately seven months of programming for the participants to feel relaxed and comfortable enough with the programme to accept any suggestions and, in general, to be receptive. This, of course, is only a conjecture. Perhaps the results merely reflect the attendance record (sometimes poor) of the group participants. Still, returning once again to the work of Badger (1977) it appears that elaborate intervention programmes such as the McGill Ready-Set-Go Infant-Child Parent Programme and the Cincinnati Maternal and Infant Care Project discussed, both with novel curricula and designed to tap the resources of the mothers involved, need an adequate period of time before adjustment is realized.

It would be remiss on the part of this researcher

to proceed any further with this analysis without noting that it is the structured groups (Groups One and Three) that do the best on all the tests (with the Bayley and Uzgiris/Hunt subtests) at the completion of the programme. Thus, it seems that parents benefit more from a programme based on rigid guidelines than from one that is more loosely constructed.

The next area of importance concerns the benefits derived from using each of the tests chosen for this study. The Bayley Mental Developmental Scale is a quantitative measure, presenting a form of intelligence measure on which to compare infants. Age is easily removed as a factor as the raw scores are computed into 'Mean developmental indices' (Please refer to the section on Developmental Tests and Measures, Chapter II). In addition, because it is a standardized instrument (that is, standardized with three subscales), this test allows one to determine whether the scores obtained by the children are due to cognitive, language and (sometimes) motor abilities. The Uzgiris/Hunt test, on the other hand, is a test which attempts to pick up the more conceptual nature of infant development. It is based on Piagetian rationale (again, which, in turn, is fundamentally related to most of the aspects of the Ready-Set-Go intervention programme). This test was selected as it allows the opportunity to determine if the children participating in

the intervention programmes were progressing conceptually (until they would eventually reach the ceiling of the test - the end of the sensory-motor period - at about eighteen months) but also, in which areas they were progressing most fluently and rapidly. The final test used in the present study, the Denver Screening Test, was selected in order to lend power to the battery of tests that was put together by confirming the results. It merely provided a quick and easy means of assessing whether the children being tested were, in fact, normal. In all cases, as will be recalled from the section discussing the review of the literature, predicability from these, as well as other infant development tests, is not reliable due to later environmental influences and, therefore, must always remain a question to be contended with.

In any event, noting these points and returning once again to the discussion of the test results, it is interesting that on the Bayley test, the results of the various analyses of variance tables on MDI scores (Tables 3, 4, 5), all the results on the testing sessions are not significantly different from each other across groups (Table 3). However, when the scores are scrutinized, it becomes apparent that there is a significant difference in scores over the course of the programme (Table 5). That is, although there are no significant differences in scores on the two consecutive testing sessions, there is, indeed, a noticeable (significant) difference between the scores obtained by the children on the pre

and post test. This finding helps support the notion that the programme was successful.

The question now remains for which groups are these differences significant? As can be seen from Table 5, only the control group, which receives no programme, does not achieve any significant change from the outset of the programme to its completion. All three experimental groups demonstrate marked changes in MDI scores due to programme intervention, with the structured group making the most significant difference. Thus, to conclude, with respect to the Bayley MDI scores, although all the groups initially begin at the same developmental levels and there is minimal difference between the consecutive testing sessions, a marked difference in all the programme groups, when comparing their initial and final performances on the Bayley Mental Scale for Infant Development, is evident, with the structured twenty-two session group showing the most significant change. Only the control group does not markably advance. The logical conclusion, therefore, is that this intervention programme does produce positive effects for its participating members and that this type of test can be used to illustrate this fact.

The Uzgiris-Hunt Ordinal Test of Psychological Development measures mental development in terms of Piagatian skills. As recently mentioned, this intervention programme was designed based on many of the Piagatian concepts that have been expounded upon in other works (Piaget, 1952).

When examining the results of the various sub-scales of the Uzgiris/Hunt test (Tables 13 through 21) it becomes obvious for which concepts the advantages of such an intervention programme are most pronounced. Furthermore, it demarcates when these advantages occur. For example, on the first two scales measuring object permanence and visual pursuit and the development of means for obtaining desired environmental events, all four groups initially achieve equal scores. However, by the second testing session, the control group begins to lag behind the programme groups in that the latter three are beginning to show substantial gains (although Group Three's gains are not as pronounced). By the end of the programme, the participants in the intervention strategy demonstrate marked benefits over the control group, especially for the structured twenty-two session group. Again, the eleven-session group illustrates its escalation in gain scores between the mid-term and post-term sessions.

The third scale measuring the development of imitation illustrates similar results in that the groups participating in the programme begin to make substantial gains during the latter part of the programme as compared to the control group which makes minimal gains. These results support those found by Eckerman, Whatby and McGehee (1979) that infants systematically went to and contacted a toy that an adult manipulated and proceeded to imitate appropriate actions. Smiling,

vocalizing and gesturing to the adult, being near her and contacting her were all also reliably linked in time to the infant's contacting her toy. Furthermore, the infants duplicated the adult's actions on the toy reliably more often than expected by a chance matching of activity. This suggests that approaching and contacting the object a mother manipulates and then imitating appropriate behaviour may be a basic social skill of the one year old. Such behaviour functions to facilitate the generation of social interaction.

The scale measuring the development of operational causality and antecedent-consequent relationships shows slightly divergent results in that the unstructured, twenty-two session group gains benefits chiefly during the first part of the programme, perhaps because the mothers in this group were given the opportunity from the outset to call upon their own creativity to teach their children about such relationships. The mothers of the two structured groups, following rigid guidelines, are more reserved and thus, perhaps, delay their children slightly. However, ultimately, performance by all three programme groups is significantly higher than the control group on the overall developmental level.

The results of the fifth and sixth scales, the ones measuring the development of schemes for relating objects, both illustrate similar results to the earlier scales in that the structured group (especially the twenty-two session one) maintains a slight advantage over the unstructured one in terms of

overall developmental score. All three groups show marked achievement over the control group. Again, the eleven session group has its largest gain during the latter part of the programme.

The question as to whether changes in developmental scores alone should be seen as a major goal to intervention programmes has been asked by many researchers such as Yarrow, Klein, Lomanace and Morgan (1975). That is, Yarrow et al. have expressed the notion that an effectively functioning child is more than an intellectual paragon. A competent child, they claim, must freely engage in creative exploration of his environment and must persist in working on problems that pose difficulties. Cognitive-motivational factors are, therefore, necessary prerequisites for sustained intellectual functions. As a result, the goals of an enrichment programme should be the development of a sense of competence and a feeling that the child has an effect on his environment. Often, emphasis on purely cognitive development leads to the development of programmes that stress the provision of toys and play material. But the desire to explore and master the environment is related to cognitive development as well. For example, Hay (1977) conducted several experiments that assessed the extent to which the experience of following persons (such as their mothers) around a novel environment and, hence, promote learning about that environment. Results revealed that

infants who followed their mothers to one place were more likely later to investigate a similar place than those who either locomoted independently or were transported by their mothers. Such a situation occurred in the programme discussed in this study. His results suggest that infants' transactions with the environment need not be considered antithetical to their social behaviour (Hay, 1977, pp. 1624-1632).

In a rather extensive experimental study with six month old black children, Yarrow et al. (1975) illustrated that the level of social stimulation, intensity of expression of positive affect, responsiveness of mothers to their infant and active stimulation via kinesthetic modality related to goal directedness, secondary circular reaction and to the manipulation of novel objects. How a mother actively engaged herself with her child, from her vocal reactions to her physical manipulations with him actually affected the way that child actively dealt with his environment with respect to many of the Piagetian notions discussed in his works (Piaget, 1952). Furthermore, these factors related to the variety responsiveness and complexity of the inanimate enviornment. These results parallel the results found in the presently discussed intervention programme. Thus, what is interesting to note is that Yarrow et al, found a positive relationship of social, environmental variables to a child's expolratory behaviour at nineteen months and to the child's Mental Developmental Index

on the Bayley Test also at nineteen months. Furthermore, almost all six month measures were positively related to nineteen-month maternal behaviour. Whether such findings will occur for the mother-child dyads participating in this programme has yet to be determined. However, because of the forementioned parallels, there is reason to suspect that they will. Although most of the children were still quite young, by the end of the first year programme it was still apparent that those who scored above average on the Bayley Test were also those who either scored well on the Uzgiris/Hunt Test or else had reached the ceiling of that test.

Thus, to conclude the discussion on the performance on the Uzgiris/Hunt Test, it is important to note that this test is, in fact, a sensitive measure designed to pick up the differences between the groups as early as the second testing session on the overall total score but can even determine in which areas these differences are occuring (see Uzgiris/Hung, 1975; Wach, 1973; Bradley and Caldwell, 1976; Field et al. 1978). The fact that the difference appears in some distinct areas at the third testing session is indicative of the fact that children are constantly changing and developing and, thus, development cannot always be reliably predicted (see Table 22). To reiterate, when changes occur, they do so significantly between the initial and final testing sessions (that is, they need the time span of the programme). Although

when examining gain scores one can see discreet gains between the second and third testing sessions. Again, the two exceptions appear for the subscale RS6B, the subscale reflecting the child's ability to act on simple objects, which changes significantly between the first two testing sessions, and for RS5, the subscale dealing with the child's ability to construct object relations in space, which changes significantly between the second two testing sessions (see Table 23). Finally, it is the structured twenty-two session group that achieves the most significant change over the course of the programme, not only in total score but on the subscales RS1, RS2, RS3B and RS6B, whereas the control group obtains no significant change in any area over the year. The other two groups change significantly only in one area each, Group Two on RS4 and Group Three on RS5 (see Table 24). (All results were covaried for age.)

The final instrument used, the Denver Developmental Screening Test, must clearly be viewed merely as a screening device. The reason for this is apparent in that changes in the various areas noted by the test (personal-social, fine motor, language and gross motor skills) as well as derived scores are not as self-explanatory as they are on either the Bayley Mental Developmental Test or the Uzgiris/Hunt Test. The reason for this is partially due to the fact that the changes are not additive or cumulative. At each age, the

child experiences a different number of items and then a percentage is tabulated. However, as a developmental measure, it is not sensitive enough to pick out developmental changes, even though it is a rather quick and easy device to use (see Table 29).

In terms of the variables themselves, it is fundamentally the personal-social item that seems to differentiate the groups as a result of the programme. This becomes apparent as early as the second testing session, although the fine motor sub-test does produce significant differences between the groups by the end of the programme (Tables 30 and 31). In sum, although these results must be regarded cautiously, they do add some insight as to what is occuring within the various groups.

Delimitations and Limitations:

The study was based at McGill University in Montreal, Canada. The subjects, therefore, were all residents of the city or its outlying regions. The programme was conducted in English, so all the mothers necessarily understood English. However, this did not have to be their mother tongue, nor was it required that they speak English at home. The programme lasted seven months and all the subjects involved were obliged to commit themselves for the entire time. To ensure this, a tuition fee was required to be paid in advance. The families were middle class in nature

and all parents were at least high school graduates. All babies were between the ages of two and fourteen months at the time of the initiation of the programme.

As mentioned in the methodology section at the outset of this paper, because of resource and personnel limitations of the programme, problems developed in the actual design of the study. One cell of the 2 x 2 (structured versus unstructured and eleven-sessions versus twenty-two sessions), that of an unstructured eleven-session group, is missing. In the future, it would be essential to include it within a study of this nature.

The programme itself was designed with the notion that in order to truly affect a child's development, both the child and the mother must be stimulated and instructed. Hence, the programme had the dual nature of being both infant-stimulatory and educational for the parent. A comprehensive staff was hired with the purpose of imporving the global development of the child. Possible influencing variables on the child were examined and included within the scope of the study.

The major limitations of the study stem from the fact that infancy is a time of rapid developmental change and that an eight month programme may not be long enough to properly assess any significant gains as measured by a variety of developmental tests. It is possible that a longer span of time is needed to ensure that an impact is being made on the

child and on the mother-infant interaction. Also, because no infant test has proven perfectly predicitive, it is impossible to state which gains (if any) will endure and which are only short term effects. However, the Ready-Set-Go research project is a longitudinal study designed to answer many of the predictive questions. Finally, it is possible that certain children respond more positively to a stranger (the examiner) and a strange situation (the test) and thus show greater cognitive abilities, while other children who may have truly benefitted from the programme are not as comfortable and, thus, do not perform as well. Finally, there is a possibility of the children experiencing 'sleeper effects' in that they may exbibit positive gains in the children's functioning long after the programme ends.

CHAPTER VI

CONCLUSION

The conclusion reached by this experimenter as well as others interested in this area (e.g. Clarke-Stewart, 1973, Yarrow et al. 1975) is that the cognitive motivational functions that are precursors to effectance motivation (the feeling that one can significantly affect one's environment) can, in fact, be measured in early infancy. These functions are influenced by early environment both physical and emotional, and in turn, are related to later intellectual performance. The effects of mothers are cumulative and are based on consistency over time due to the fact that these consistencies reflect maternal attitudes and basic orientations, thereby affecting the infant's active interaction with the environment.

Thus, by intervening in the interaction and stimulatory patterns of the mothers with their children, a programme such as Ready-Set-Go, with its three different intervention strategies, can influence the interactions between the child and his environment which, in turn, can influence the child's later intellectual performance. A child's intellectual and personal-social development occurs in a field of reciprocal interactions with people and objects in his environment. The child elicits stimulation from his caretakers by his signals and the quality of his responsiveness to their responsive behaviour to him. In this way, he develops the feelings of competence and mastery referred to earlier in the work of White (1959, 1960, 1963). Therefore, both the provision of stimulation materials for the child and the interaction with mothers and other social beings are important. The programme discussed above thus built itself around these fundamental elements. Regardless of treatment, all children's development was facilitated as a result. Mothers became more active agents and even more competent teachers in their child's worlds. Children became more active explorers, imitators and manipulators. As was revealed in the results section, it is true that some benefitted more than others. Still, no one, not even members of the control group, did not reap at least partial, temporary

gains from this type of intervention strategy with its foci on attention to both the mother alone and to the mother-child dyad. Both aspects are important. In other words, stimulation alone is not likely to sustain interaction effects. It is environment which is necessary for continued cognitive development. Thus, it is important to modify a child's overall arousal level so that he is more receptive to stimulation in general and learns to respond adaptively to people and objects in the environment. (There is, of course, the possibility of a Hawthorne effect taking place but this is an ever-present problem whenever attention and intervention is provided).

CHAPTER VIII

IDEAS FOR FUTURE STUDIES

The results of a study of this nature open many avenues of exploration. Some of the more interesting possibilities include the questions of whether the gains that the children in this programme experience can be sustained without further intervention (i.e. are gains permanent?); do mothers use stimulatory techniques as the child matures (i.e. in later childhood) without any guidance from programme personnel; can children acquire similar benefits from a condensed eleven session weekly (as opposed to bi-monthly) programme; should a programme of this nature be given twice weekly for an eleven week period; can similar results occur by simply providing parent education sessions and eliminating the infant stimulation aspect of the programme (i.e. do children, in fact, benefit from the stimulation?)? (This would be, in fact, a less expensive, more convenient proposition. However, aside from losing the

stimulation aspect of the programme, parents would lose the opportunity to model other good mothers and staff, as well as the opportunity for staff feedback).

With these questions in the foreground, it is apparent that the area of research of infant stimulation and intervention is not only an interesting one but also an important one. This researcher hopes that others will continue to study the nature and potential of programmes similar to the one discussed in this study. Hopefully, a body of literature will grow in the process.

APPENDICES

APPENDIX No. 1

LIST OF CLASSROOM TOPICS FOR GROUP 1

(STRUCTURED TWENTY-TWO SESSIONS)

AND FOR GROUP 2

(UNSTRUCTURED TWENTY-TWO SESSIONS)

ORIENTATION SESSION

PART I: We Learn about how our Children Grow and Learn

1. Development: Thinking - Processes I
   Development: Thinking - Processes II

2. Development: Sensory-Motor I
   Development: Sensory-Motor II

3. Development: Language I
   Development: Language II

4. Family Nutrition I
   Family Nutrition II

PART II: Parent-teaching Strategies

5. Lesson Planning - (C. Rahn)
   Teaching and Management Techniques

6. Everyday Use of the Word Behaviour
   Zeroing-in on the Behaviours we Observe
   Practice Session

7. Review
   Another Look at the ABCs
   Consequences of Behaviour

8. Practice Session

9. Shaping
   Task Analysis
   Fading

10. Practice Session

11. Decreasing Behaviour

12. Practice Session

13. Generalization of Learning

14. Practice Session

15. General Review and Practice

16. Wrap-up Session

APPENDIX No. 2

LIST OF CLASSROOM TOPICS FOR GROUP 3 (STRUCTURED ELEVEN SESSIONS)

1. Orientation
2. Cognitive Development
3. Sensory-Motor Development
4. Language Development
5. General Discussion on Development
6. Family Nutrition
7. Lesson Planning
   Teaching and Management Techniques
8. Everyday Use of the Work Behaviour
   Observing Behaviour
9. Another Look at our ABCs
   Consequences of Behaviour
10. Shaping
    Task Analysis
11. Decreasing Behaviour
    Guidelines
12. Generalization of Learning

APPENDIX No. 3

HOME ASSIGNMENT No. 1

Due Date: _____

1. Re-read this week's notes.

2. Turn to the ACTIVITIY SECTION of this manual. Read section most relevant to your child.

3. Use the form on the following page to complete Daily Programmas (for each day of the week until next class) including a Formal Lesson for each day. Plan the environment (i.e. your child's room, etc.) and your time accordingly.

DAILY PLAN

Name: (parents)

Child: Age:

Date:

DAILY PROGRAMME I

FORMAL LESSON

Name: (parent)

Child: Age:

Date:

ACTIVITY:

Developmental area(s) involved:

Purpose

Steps:

1.

2.

3.

4. (etc.)

Comments: (What worked and what did not work and possible reasons why)

APPENDIX No. 4

HOME ASSIGNMENT No. 2

Due Date: _____

1. Re-read this week's notes.

2. "Teach" this information to your husband.

3. Each of you should then complete the quiz. This should be done separately (in different rooms, etc.) and without notes. Bring them to hand-in during your next session.

4. Observe your child carefully and "zero-in" on three behaviours to describe. These behaviours should include one from the cognitive area; one from the language area; and one from the sensory motor area. You may want to refer back to your Part I notes on Development to assist you.

5. Record your descriptions on the forms provided.

6. Answer the questions at the bottom of each form after completing your descriptions.

7. Enough forms have been provided so that your husband may complete this exercise as well. If he does, then bring his forms along with yours to hand in next week.

APPENDIX No. 5

HOMEWORK ASSIGNMENT No. 3

OBSERVATION No. _____

(use back if necessary)

Name: _____ Date: _____

Child's Name: _____ Age: _____

BEHAVIOUR OBSERVED: _____

Cognitive ___ Language ___ Sensory-Motor ___

1. Are you able to observe the behaviour (count how many times it happened) by using your description? (If not, you may think of going back to "polish" it up.)

2. Are there any changes you think you should make? If "yes", what are they?

APPENDIX No. 6

HOME ASSIGNMENT No. 4

Due Date: _____

1. Re-read this week's notes.

2. "Teach" the material to your husband.

3. Complete the Quiz. Have your husband complete the Quiz as well (if possible). It should be completed without notes. (Each of you should complete the Quiz by yourself.) Bring the completed Quiz(zes) with you to the next session.

4. Use the forms provided in this section to complete the following assignment:

   Use the ABC analysis to look at:

   (a) Five examples of your child's behaviour;

   (b) Three examples of another adult's behaviour (i.e. husband, mother, other realtive, etc.); and

   (c) Two examples of behaviour from outside your home (i.e. when you do your weekly shopping in the supermarket, shopping at a plaza, etc.).

   Two sets of forms have been provided so that your husband may also complete the assignment.

ABC ANALYSIS

Name: _____ Date: _____

Child (age: _____)

	A.	B.	C.
1.			
2.			
3.			
4.			
5.			

ADULT

A. B. C.

1.

2.

3.

OUTSIDE OBSERVATION

A. B. C.

1. Place

2. Place

APPENDIX No. 7

QUIZ No. 1

Name: _____ Date: _____

1. An unbiased approach to observing behaviour is to describe only what you can _____ an individual doing.

2. When we say: "Harry acts that way because he is a cranky child", we are not actually describing Harry's _____ but rather _____.

3. A "lesson plan" is _____

_____

4. In preparation for a "lesson plan" it is first necessary to _____ on the behaviour(s) we may want to work with.

5. A good description gives a very clear picture of

_____

_____

to the observer.

6. When we say: "Behave yourself", the work behaviour has a definite meaning but the meaning is _____ _____

7. How good a description is depends on _____ _____ _____

8. There is no standard, correct _____ of a behaviour.

9. In everyday usage when we talk about behaviour we often actually describe our 1) _____, 2) _____ and 3) _____ of the behaviour.

10. Describing only what you can see an individual doing is an _____ method of talking about behaviour.

APPENDIX No. 8

QUIZ (ABCs) No. 2

Name: _____ Date: _____

1. Consequences of behaviour determine _____ _____ a behaviour may occur.

2. _____ set the occasion for the behaviour to occur.

3. Sally sees a toy on the shelf. She screams: "Give it to me". Seeing the toy on the shelf is the _____ _____. Screaming: "Give it to me" is the _____

4. If Johnny is whining more each day, it is likely that his whining is being followed by _____

5. A behaviour is less likely to occur if it is immediately followed by _____

6. The ABC analysis is a technique for _____ behaviour.

7. The ABC analysis is useful for:
   (a) _____ and
   (b) _____

8. A car approaches a traffic light. The signal is green so the driver proceeds to cross the intersection. In this example :

the Antecedent was _____;

the Behaviour was _____; and

the Consequence was _____

9. Baby smiles. Gramdma says: "Hello there!" Baby smiles again. In this example:

the Antecedent was _____;

the Behaviour was _____; and

the Consequence was _____

10. Baby plays with mobile. Pulls on string. Tug of the string makes clown move. Baby pulls string again. In this example:

the Antecedent was _____;

the Behaviour was _____; and

the Consequence was _____

APPENDIX No. 9

REINFORCEMENT SURVEY

Please think about each question very carefully before answering. For each question, list items in order of child's preference.

1. What special snacks does your child enjoy?

1. _____ 3. _____

2. _____ 4. _____

2. What mealtime foods does your child enjoy?

1. _____ 3. _____

2. _____ 4. _____

3. What drinks does your child enjoy?

1. _____ 3. _____

2. _____ 4. _____

4. What games does your child like to play with you or with others?

1. _____ 3. _____

2. _____ 4. _____

5. What activities, besides games, does your child enjoy (e.g. listening to music, watching TV, etc.).

1. _____ 3. _____

2. _____ 4. _____

6. What words of praise or compliments does your child enjoy?

1. _____ 3. _____

2. _____ 4. _____

7. What person(s) does your child enjoy being with most?

1. _____ 3. _____

2. _____ 4. _____

8. What does your child like to do with his favourite person(s)?

_____

_____

_____

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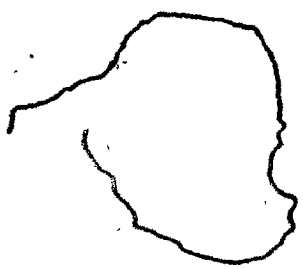

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