

1-1-1975

Early intervention and the vulnerable infant

Naomi R. Soifer

Follow this and additional works at: <https://digitalcommons.stritch.edu/etd>



Part of the [Special Education and Teaching Commons](#)

Recommended Citation

Soifer, Naomi R., "Early intervention and the vulnerable infant" (1975). *Master's Theses, Capstones, and Projects*. 617.
<https://digitalcommons.stritch.edu/etd/617>

This Research Paper is brought to you for free and open access by Stritch Shares. It has been accepted for inclusion in Master's Theses, Capstones, and Projects by an authorized administrator of Stritch Shares. For more information, please contact smbagley@stritch.edu.

EARLY INTERVENTION AND THE VULNERABLE INFANT

by

Naomi R. Soifer

A RESEARCH PAPER
SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS IN EDUCATION
(EDUCATION OF LEARNING DISABLED CHILDREN)
AT CARDINAL STRITCH COLLEGE

Milwaukee, Wisconsin

1975

CARDINAL STRITCH COLLEGE

LIBRARY

Milwaukee, Wisconsin

This research paper has been
approved for the Graduate Committee
of Cardinal Stritch College by

Sister Joanne Marie Kiehan
(Advisor)

Date Mar. 1, 1975

TABLE OF CONTENTS

CHAPTER	Page
I. INTRODUCTION	1
Rationale for Early Intervention	
Purpose and Scope	
Definitions	
Summary	
II. REVIEW OF THE LITERATURE: INTERVENTION AND THE VULNERABLE INFANT	8
Correlational Studies	
Experimental Studies	
Conditioning Experiments	
Enrichment Studies	
Field Studies	
Intervention Models	
Curriculum Development	
Summary	
III. CONCLUSION	62
APPENDIX A CLARIFICATION OF PIAGETIAN CONCEPTS.	67
APPENDIX B CHILDREN'S CENTER, SYRACUSE UNIVERSITY INFANT CURRICULUM.	70
APPENDIX C LANGUAGE GOALS	74
BIBLIOGRAPHY	77

CHAPTER I

INTRODUCTION

Rationale for Early Intervention

As expertise in the area of special education and remediation has advanced, the age at which learning difficulties has been detected and remediation begun has constantly been lowered. In the mid 1960's Program Head Start was initiated with high hopes that by starting children of low socioeconomic status, who had a high probability for poor academic achievement, in a readiness pre-kindergarten program, academic failure could be avoided. However in many instances the effects were not lasting and educators felt that intervention was started too late.¹

Concurrent with the downward extension of educational programs was a change in thinking about intelligence with a shift from the concept of fixed intelligence and genetically predetermined development to that of plasticity

¹Urie Bronfenbrenner, A Report on Longitudinal Evaluations of Pre-school Programs, Vol. 2: Is Early Intervention Effective? DHEW Publication No (OHD) 74-25, 1974; Susan W. Gray and Rupert A. Klaus, The Early Training Project: A Seventh Year Report, DARCEE, John F. Kennedy Center for Research on Education and Human Development, George Peabody College for Teachers, Nashville, Tennessee, 1969.

of intelligence and the importance of early life experiences. J. McV. Hunt¹ in 1961, reviewed the research on the influence of experience on intelligence and came to the conclusion that "the assumption that intelligence is fixed and that its development is predetermined by genes is no longer tenable." Instead Hunt regards IQ as a phenotype "for which the genes set limits of potential development but which is finally developed through encounters with the environment", implying that "it may be feasible to govern the encounters that children have with their environments, especially during the early years of development, to achieve a substantially faster rate of intellectual development and a substantially higher adult level of intellectual capacity."²

Previously, the study of infant development was primarily concerned with collecting normative data on the sequence and rate of maturational unfolding with little or no attention paid to the experiences or environment of the infant. This shift in the concept of intelligence brought about a renewed interest in infant development including more recognition and reappraisal of the work of

¹Joseph McV. Hunt, Intelligence and Experience (New York: Ronald Press, 1961).

²Ibid., p. 363.

Piaget. Piaget¹ believes that cognition develops in an unchanging sequence of stages and that functioning at each stage restructures the interaction between the child and the environment in such a way as to produce the next stage, suggesting that cognitive structures are created by the child as a consequence of his actions. Bloom² synthesized major longitudinal studies of human growth to explore the times when characteristics develop and conditions under which they can be altered, and emphasized the importance of intellectual development during the first four years of life: "In terms of intelligence measured at seventeen years of age, about 50% of development takes place between conception and age four, about 30% between four and eight years of age, and about 20% between eight and seventeen."³

Over the past few years, many states have passed legislation similar to Chapter 89, Laws of 1973 of the State of Wisconsin which provided as an integral part of free public education, special education sufficient to meet the needs and maximize the capabilities of all children with exceptional needs. A child with exceptional needs was defined as "any child who has a mental, physical, emotional

¹Jean Piaget, The Origins of Intelligence in Children (New York: Ballentine Books, 1954).

²Benjamin S. Bloom, Stability and Change in Human Characteristics (New York: John Wiley and Sons, 1964).

³Ibid., p. 88.

or learning disability which if the full potential of the child is to be attained requires educational services to the child to supplement or replace regular education."¹ Under this law the state is responsible for the education of exceptional children from three to twenty-one years of age but no provision is made for children below the age of three.

In the United States there are currently approximately three million births per year. Of these infants it is estimated that approximately 13% may be considered vulnerable to developmental delay.² Although the 13% figure is considered optimally high, the magnitude of the problem would still be great if the percentage were halved or quartered.

With the realization that early experiences are important for subsequent development and since the vulnerable infant might not have "the experiential and perceptual foundation upon which to build a superstructure of new concepts, thus experiencing confusion, frustration, and

¹Judi Greenberg, "Analysis of Ch. 89, Laws of 1973, Relating to Special Education of Children with Exceptional Educational Needs," Informational Bulletin 73-7, Legislative Council Staff, State Capitol, Madison, Wisconsin, August 17, 1973, p. 7.

²E. D. Alberman and H. Goldstein, "The At Risk Register . . . A Statistical Evaluation," Br. J. Prev. Social Med. 24 (1970): 129-135, cited by John Meier, Screening and Assessment of Young Children at Developmental Risk, The President's Committee on Mental Retardation, Washington, D. C., DHEW Publication No. (OS), March 1973, pp. 73-90.

failure to learn,"¹ it is the contention of this author that intervention should begin as soon as vulnerability is determined--from birth onward.

Purpose and Scope

The purpose of this paper was threefold: (1) to review the literature to identify the early life experiences and essentials of the environment necessary for optimizing development; (2) to analyze how this knowledge has been and can be applied to developing intervention programs for vulnerable infants; and (3) to evaluate the results being obtained by the programs already in existence. This survey focuses on studies concerned with children from birth to three years of age.

Definitions

Vulnerable infant: The term vulnerable infant refers to the infant exhibiting developmental delay or who has a high probability for showing later appearing developmental delay. Tjossem identified the following three categories of infants who for different reasons can be regarded as being in need of intervention to optimize their cognitive development: established risk, environmental risk and high risk infants.

¹Eliosa de Lorenzo, "The Effectiveness of Early Stimulation of High Risk Infants," in Brain and Intelligence. The Ecology of Child Development, ed. F. Richardson (Baltimore, Maryland: National Educational Press, 1973), p. 168.

Established risk infants are those whose early appearing aberrant development is related to diagnosed medical disorders of known etiology and with known expectancies for developmental outcome within specified ranges of developmental delay. Interventions for these children are conceived as those which aid the child to develop and function at the higher levels of the ranges set for their limiting disorder. Included in this group are children with Down's syndrome, microcephaly, Turner's syndrome and untreated inborn errors of metabolism among others.

Environmental risk applies to biologically sound infants for whom early life experiences including maternal and family care, opportunities for expression of adaptive behaviors, and patterns of physical and social stimulation are sufficiently limiting to the extent that, without corrective intervention, they impart high probability for delayed development.

High risk infants present a history of antenatal, natal, and neonatal events suggestive of biological insult(s) to the developing organism and which, either singly or collectively, increase the probability of later appearing aberrant development. Early diagnosis of enduring developmental fault is difficult or inconclusive in these biologically vulnerable infants who must often require close surveillance and modified care during the early developmental years. Included in this group are infants who, among others, are premature or low-birth-weight, the product of complicated pregnancies and/or deliveries, and those who encounter difficulties in adaptation to extrauterine life.¹

Intervention: Intervention refers to " . . . the introduction of planned programming deliberately timed and arranged in order to alter the anticipated or projected course of development"² focusing on cognitive development, speech and language, and adaptive behavior.

¹Theodore D. Tjossem, "Rationale for Early Identification of High Risk Infants," in Allied Health Approaches to Program Planning for Infants at Risk: Conference Proceedings, eds. Marianne Lohan, Eileen Bughman, and Ruth Heingmann (Chicago, Ill.: National Easter Seal Society for Crippled Children and Adults, 1974), p. 17.

²Irving Sigel, "Developmental Theory: Its Place and Relevance in Early Intervention Programs," Young Children 27 (1972):364.

Summary

This chapter was concerned with the rationale for early intervention in the vulnerable infant, stressing the importance of early experiences on cognitive development. Noted is the magnitude of the problem and the fact that current legislation is providing expanding services for exceptional children but is not extending downward in age far enough to take advantage of the period of greatest intellectual development. The purpose and scope of the paper was discussed and necessary definitions included.

CHAPTER II

REVIEW OF THE LITERATURE: INTERVENTION AND THE VULNERABLE INFANT

"As it stands now, practically all therapeutic effort begins long after the infancy period has passed. It is time to examine the possibility that changes can be brought about in the infant who deviates in some manner from the normal model" ¹

Attempts at amelioration should represent a synthesis of the available facets of our knowledge of the normal course of development and the variables that influence it. As an infant interacts with his environment, structural and conceptual organizations of behavior are formed which will alter the subsequent interactions the child (delayed as well as normal) will have with future environments. If we can analyze the ways in which particular interactions with the environment organize a young child's behavior and if we can determine how a particular organization operates as a prerequisite to subsequent forms of behavior, we will then be in a better position to structure the form and time sequence of interactions necessary to produce a more rapid acceleration in the acquisition of new and more complex forms of behavior. ²

¹Ray H. Barsch, "The Infant Curriculum . . . A Concept For Tomorrow," in Exceptional Children, Vol. 1 The Normal Infant, ed. Jerome Hellmuth (New York: Brunner/Mazel, 1967):560.

²Diane Bricker and William Bricker, Infant, Toddler, and Pre-school Research and Intervention Project: Report - Year III, IMRID Behavioral Science Monograph No. 23 (Nashville, Tennessee: Institute on Mental Retardation and Intellectual Development, George Peabody College for Teachers, 1973), p. 6.

This chapter reviews the literature on early intervention in terms of (a) correlational studies, to determine what types of environments facilitate development; (b) experimental studies, to determine ways to manipulate the environment to bring about desired changes; and (c) field studies, to evaluate how effectively theory can be put into action focusing on models of intervention and curriculum.

Correlational Studies

One approach in attempting to isolate and identify the experiences that are important for nurturing development during the first years of life is to study the relationship of contrasting environments and child-rearing practices with developmental outcome. It is important to investigate two major dimensions of the environment:

One is the objective environment, or the world of things which the child manipulates. The objective environment provides stimulus input which must be processed, thus contributing materially to intellectual and motivational development. The objective environment provides feedback to the child as to the relevance of his attending and exploratory behavior, in turn it affects his ability to process information efficiently and to utilize it effectively. It provides reinforcement for his manipulative behaviors, and helps in the development of a concept of personal control over his world and himself.

The second dimension . . . is the instrumental environment or the world of people. The instrumental environment consists of those significant others who mediate between the child and the objective environment by imposing temporal and spatial order upon it. The effective instrumental agent in interacting with the child,

provides behavior models and arranged appropriate reinforcement contingencies to encourage and sustain continued development and motivation.¹

Ecological studies of children in a variety of natural habitats are critical for both the formulation of a comprehensive theory of human behavior and to assist in the practical task of designing intervention environments which can presumably facilitate development.² Studies which began to appear in the early 1960's contrasting the developmental picture of deprived and non-deprived groups tended to show that children from the deprived or disadvantaged groups were already functioning at a lower level than their non-deprived peers by the time they reached public school. Once compensatory preschool programs were begun and data were available, a consistent deficit in functioning levels in the deprived group was found.³

¹Barbara Gilmer, James O. Miller and Susan Gray, Intervention with Mothers and Young Children: A Study of Intra-family Effects, DARCEE Papers and Reports, Vol. 4 No. 11 (Nashville, Tennessee: Demonstration and Research Center for Early Education, George Peabody College for Teachers, 1970), p. 2.

²Sibylle K. Escalona, The Roots of Individuality: Normal Patterns of Development in Infancy (Chicago: Aldine Publishing Co., 1968); Alice S. Honig, Bettye M. Caldwell, and Jordan Tannenbaum, "Patterns of Information Processing Used by and with Young Children in a Nursery School Setting, Child Development 41 (1970): 1045-1065; Burton L. White et al., Experience and Environment: Major Influences on the Development of the Young Child, Vol. 1 (Englewood Cliffs, N. J.: Prentice Hall, 1973).

³Bettye M. Caldwell, "The Effects of Psychosocial Deprivation on Human Development in Infancy," Merrill-Palmer Quart. of Beh. and Dev. 16 (1970): 379-411.

In information published by Bayley¹ on data associated with the standardization of the revised Bayley Scales of Mental and Motor Development establishing performance curves for relevant sub-groups of infants between one and fifteen months of age, there were no significant differences on the mental scales as a function of social class, sex, race, or parental education. On the motor scales, Negro infants tended to score significantly higher than whites up to twelve months of age but not after that. Therefore the difference in favor of the non-deprived group begins to occur somewhere between fifteen months and three years and the gap widens as the children grow older.

The effects of social and cultural environment on cognitive development and its influence on basic learning patterns has not been well delineated to date, but some general trends are becoming apparent. Tulkin and Kagan² examined the experiences of thirty infants from middle class environments and twenty-six infants from working class environments. Two-hour observations were made on two separate days when the infants were about ten months old.

¹Nancy Bayley, "Comparisons of Mental and Motor Test Scores for Age One Through Fifteen Months by Birth Order, Race, Geographical Location and Education of Parents," Child Development 36 (1965):379-411.

²Steven Tulkin and Jerome Kagan, "Mother Child Interaction in the First Year of Life," in The Competent Infant, eds. L. Joseph Stone, Henrietta T. Smith and Lois B. Murphy (New York: Basic Books, 1973), pp. 949-955.

The following environmental variables were compared for the two groups:

- Crowdedness ratio.
- Number of five-second intervals with interaction with adults.
- Minutes of TV.
- Minutes of radio.
- Number of toys within reach in a twenty-minute period.
- Number of environmental objects played with in a twenty-minute period.
- Minutes with no barriers.

Findings indicated that the working class children were bombarded with more extraneous noise, lived in more crowded home conditions, had more interactions with adults other than mothers, watched more TV, had less opportunity to explore and manipulate their environment and spent less time without barriers. On maternal behavior, middle class mothers were more extensively involved in verbal interaction with their infants, they responded to a higher percentage of and more quickly to the infant's frets, and they were more likely to provide their infants with a greater variety of stimuli.

Caldwell¹ developed a procedure at Syracuse Children's Center for measuring the amount of stimulation present in the home. The Inventory of Home Stimulation or STIM as it is referred to covers the following areas:

- Frequent and stability of adult contact.
- Amount of developmental and vocal stimulation.
- Need gratification.

¹Bettye M. Caldwell, "Descriptive Evaluations of Child Development Settings," Pediatrics 40 (1967):46-54.

Emotional climate.
Avoidance of restriction.
Breadth of experience.
Aspects of physical environment.
Available play materials.¹

The inclusion of the variety of areas was based on the belief that "the cognitive development of the young child is enhanced by, if not actually dependent on the presence of a warm emotional relation with parents, stability of parental figures, a safe and stimulating physical environment, and a variety of tactual and visual experiences."²

When the STIM scores for a group of lower class families were compared with scores for a group of middle class families significant differences were found, indicating a higher potential for stimulation in the middle class homes. Correlation of the Cattell Infant Intelligence scores with STIM ratings revealed that the stimulation level was related to the performance of the children: that is children from homes with low stimulation scores also scored below the median on the Cattell intelligence tests.³ However, evidence also suggests that the lower

¹Ibid., p. 50.

²Jordan A. Tannenbaum, "Home Stimulation Versus Developmental Scores for Children Attending the Children's Center," Syracuse University, Syracuse, New York, 1969 (Mimeographed), p. 4.

³Caldwell, "Descriptive Evaluations of Child Development Settings."

class environment is not necessarily homogeneous, and that test scores during the first year of life correlated with the amount of support for development found within the home.

Kagan¹ conducted a longitudinal study of 160 first born Caucasian children in the Boston-Cambridge area that in part is concerned with differential rates of cognitive development as a function of different child rearing practices associated with social class. Measurements of fixation time, vocalization, smiling, and cardiac deceleration in response to a set of four clay faces, human forms, and transformations of human speech were taken at four, eight, thirteen and twenty-seven months for groups of upper middle class children and lower middle class children. There was no relationship between infants' fixation time and class level at four months; however, after four months a difference between the two groups became evident, suggesting that upper middle class children are more likely to be taught a richer set of symbolic structures surrounding faces than lower middle class infants. Therefore, the former possess richer sets of hypotheses to faces and thus display longer fixation times.

¹Jerome Kagan, "Some Response Measures that Show Relations Between Social Class and the Course of Cognitive Development in Infancy," in Stimulation in Early Infancy, ed. Anthony Ambrose (London: Academic Press, 1969), pp. 253-260.

Cardiac deceleration, presumed to be elicited by surprise, was greater for upper middle class infants at four months than lower middle class infants. In home observations of parent-child interaction, face-to-face contact between infant and mother was greater for the upper middle class, giving these infants an opportunity to develop a better scheme for the face and thus to show more surprise to a discrepant stimulus.

Vocalization showed no relation to class during the first year but when the children could speak meaningful sentences at twenty-seven months, a positive correlation between education level and vocalization was found.

No correlation between smiling and social class was evident at four or eight months; however, a positive relationship between smiling and social class to speech stimuli began to appear at thirteen months. Although no differences were found on performance curves on the standardization of the Bayley Mental Scales as a function of social class before one year of age, Kagan's study shows differences as early as four months of age on responses that had primarily to do with attending behavior.

Marked trauma and extreme deprivation have been shown to have a detrimental effect on development¹ but the impact of less extreme variations in experience; that is,

¹Sally A. Provence and Rose C. Lipton, Infants in Institutions (New York: International Universities Press, 1962).

those within the normal range, is not as well defined. Yarrow¹ explored the relationships of social stimulation variables and inanimate stimulation variables on different aspects of the functioning of five to six month old infants. Inanimate stimulation variables were divided into three dimensions: variety, or the number of different objects within reach of the infant during observation; responsiveness, or the feedback potential inherent in objects; and complexity, or the extent to which objects provide information through various modalities. Social stimulation variables referred to the caretaker behavior in terms of level, variety, positive effect, contingency response to positive vocalizations, and contingency response to distress vocalizations. Infant functioning was concerned with the infant's general status in terms of mental development index, psychomotor development index, and social responsiveness; language, gross and fine motor development, goal directed behaviors, cognitive functions and exploratory behavior. Results suggest that there is a reciprocal interaction between infant characteristics and environmental events. Cognitive-motivational functions which refer to such behaviors as reaching persistently for objects, attempting to have an effect on and elicit responses from

¹Leon J. Yarrow et al., "Dimensions of Early Stimulation and Their Differential Effects on Infant Development," Merrill-Palmer Quarterly of Beh. and Dev. 18 (1972):205-218.

objects seem particularly sensitive to both inanimate and social stimulation. Yarrow hypothesized that these behaviors can be viewed as an early expression of a competence or effective motive and that the role of contingent mother-infant interaction is important in the development of the child's belief that he can affect his environment, that is, that he can bring about reinforcement by his actions.

The finding of Rubenstein¹ of a significant difference in the exploratory behavior between infants whose mothers were rated high on attentiveness and those whose mothers were rated low on attentiveness, with infants of highly attentive mothers exhibiting more exploratory behavior, is consistent with Yarrow's results. Rubenstein suggests that it could conceivably be the variety inherent in large quantities of attentiveness that is critical. She points out that repetitive, unvarying stimulation is not expected to facilitate exploration.

A currently ongoing longitudinal study concerned with the development of competence is Burton White's Harvard Preschool Project.² The goals of the project are to:

¹Judith Rubenstein, "Maternal Attentiveness and Subsequent Exploratory Behavior," Child Development 38 (1967): 1089-1100.

²Burton White et al., Experience and Environment: Major Influences on the Development of the Young Child, Vol. 1 (Englewood Cliffs, N. J.: Prentice-Hall, 1973).

Develop measuring instruments for one to three year olds for dimensions of competence, stream of experience and salient environmental factors.

Study the process of optimal development and restricted development of competence occurring naturally.

Find the major apparent differences in patterns of experience in the two sets of children.

Find the major apparent environmental causes for the differences in experience most likely to influence the development of competence.

Isolate those that might be important to change.

Test ideas about the influence of experience on the development of competence experimentally by providing optimal patterns of experience for one to three year olds who would ordinarily develop average levels of competence.

Refine ideas according to results of the experiment, adjust the hypothesis and retest.¹

At the time of publishing Experience and Environment, the project had not yet reached the point of testing its observational findings experimentally. However, it does report findings in terms of differences in patterns of experiences and "best guesses" about most effective child-rearing practices. Findings indicate that environments of competent children differ markedly as early as twelve to fifteen months and increasingly thereafter. The major difference between the competent and non-competent children was found to be in their interactions with their mothers. White suggested that developmental divergence first becomes clear during the second year of life. It is at this point that the emerging phenomena of locomotion, language, and negativism force maternal reactions that become fairly fixed by the time the child is eighteen months old. Mothers of competent infants were found to be ones who:

¹Ibid., p. 22.

Talk to the child a great deal at a level the child can handle.

Make the child feel as though whatever he is doing is usually interesting.

Lead the child to believe he can expect help and encouragement most but not all of the time.

Demonstrate and explain things to the child on the child's instigation.

Prohibit some activities consistently and firmly.

Show imagination by making interesting associations and suggestions to the child when opportunities present themselves.

Strengthen the child's intrinsic motivation to learn.

Give the child a sense of task orientation--a notion that it is desirable to do things well and completely.

Make the child feel secure.

Design a physical world that is suited to nurture the child's growing curiosity, full of small, manipulable, visually detailed objects, containing things to climb and materials to nurture more mature motor interests.

White summarizes his approach by saying, "What we are suggesting is that in our current state of ignorance about desirable curricula for such [infant education] programs, we could do worse than emulate successful parents."¹

A longitudinal study that bears promise of yielding data that will be applicable to programming for vulnerable infants is being undertaken by a research group at the Rose Kennedy Center for Research in Mental Retardation and

¹Ibid., p. 247.

Human Development, Albert Einstein College of Medicine.¹

The protocol of this study is to systematically deal with all observable behavioral events that constitute an infant's waking life in order to study the effects of early experience on the course and outcome of development during the first two years of life. To date some data have been collected on normal infants reared in widely differing family atmospheres. Similar data will be collected on various high risk and damaged infant populations. It is anticipated that these results will help delineate aspects of experience that are lacking or present to an undue degree in their environment and help determine the regularities of experience that are essential to support development of these infants.

In summary, research findings suggest that certain environments are more supportive of nurturing development and adaptive behavior in infants than others. In studies concerned with differing environments according to socioeconomic status, it becomes evident that the lower class child's objective and instrumental environment can be disorganized to the point of chaos; and that rather than suffering from sensory deprivation, he suffers from

¹Sibylle K. Escalona, "Basic Modes of Social Interaction: Their Emergence and Patterning During the First Two Years of Life," Merrill-Palmer Quarterly of Beh. and Dev. 19 (1973):205-232.

disorganization in his sensory environment--in a sense, from overstimulation. An environment that is supportive of development is a responsive environment or one in which an infant can bring about reinforcement by his actions, a non-restrictive environment that provides a variety of sensory experiences, and an environment with a warm stable infant-caretaker relationship, with a high degree of verbal interaction.

Experimental Studies

Another approach in determining what experiences are important for optimal development and how experiences can be structured to assure optimal development is through experimental studies where some aspect of the infant's experience is manipulated or controlled and the resulting effect on behavior noted.

The field of infant research has shown a dramatic spurt since the mid 1950's due in part to advances in experimental techniques. Studies on infant learning, perception, and attention have been facilitated by the finding that an infant can exhibit discriminatory choice behavior and therefore conditions could be arranged to enable an observer to determine which of two targets an infant would look at first or most frequently; by the

realization that changes in autonomic parameters could serve as indicator responses, signaling responses, or habituating to perceptual events; and by new approaches to learning which employed combinations of operant and classical conditioning techniques and more appropriate response channels. These studies have provided feedback, showing that the infant is an early, effective and avid learner.¹

Conditioning Experiments

Conditioning experiments have shown that learning takes place even in the newborn and that by manipulating environmental conditions changes can be brought about in infant behavior. They also demonstrate techniques of providing a responsive environment to promote children who have confidence in themselves and their ability to cope with their environment.²

Rheingold, Gewirtz and Ross³ conducted an experiment in which they were able to increase vocalizations of

¹L. Joseph Stone, Henrietta T. Smith and Lois B. Murphy, eds. The Competent Infant (New York: Basic Books, 1973), pp. 4-10.

²John H. Meier, "A Survey of Infant Stimulation and Intervention Programs," in Parent Counseling and Infant Stimulation: Workshop Proceedings (Denver, Colorado: Mountain-Plains Regional Center for Services to Deaf-Blind Children, April, 1972), p. 24.

³Harriet L. Rheingold, Jacob L. Gewirtz, and Helen W. Ross, "Social Conditioning of Vocalizations of the Infant," Journal of Comparative & Physiological Psych. 52 (1959):68-73.

three month old normal institutionalized infants by socially reinforcing any vocalizations made through simultaneously smiling, clucking, and touching the infants' abdomens.

Todd and Palmer¹ conducted a similar experiment but used two groups; one received auditory reinforcement to babbling with an adult present, the other received auditory reinforcement to babbling but with no adult present. Both groups increased vocalizations but the group with the adult present produced significantly more vocalizations than the group without the adult present.

Craig Ramey and John Watson² reinforced all of an infant's utterances that approached or approximated speech while the infant was in a crib, through a voice actuated microphone system electronically tuned so that it screened out irrelevant babbling and reinforced specific sound which had been analytically and psycholinguistically determined to be a part of spoken language. These data show that three to four years later these children were far more articulate and talkative than their matched controls.

¹G. Todd and B. Palmer, "Social Reinforcement of Infant Babbling," Child Development 39 (1968):591-596.

²John Watson and Craig Ramey, "Reactions to Response-Contingent Stimulation in Early Infancy," (in press) cited by John Meier, "A Survey of Infant Stimulation," p. 37.

Papousek¹ demonstrated that a three day old infant could learn to turn his head in the direction of the sound of a bell through classical conditioning procedures. By using the rooting reflex to get the infant to turn his head, pairing this response with the ringing of a bell and allowing the infant to suck on a bottle containing milk when he turned his head, Papousek was able to get the infant to turn his head to the sound of the bell without stimulating the corner of the infant's mouth.

Results of conditioning experiments by Siqueland and Lipsitt² demonstrated that discriminative behavior is present in infants four days and under and that some environmental circumstances act as reinforcing stimuli to shape or selectively strengthen behavior in infants in the first days of life.

White³ questions whether one can generalize extensively on the findings from brief laboratory-like teaching sessions to the issue of complex cumulative effects of

¹Hanus Papousek, "Experimental Studies of Appetitional Behavior in Human Newborns and Infants," in Early Behavior, eds. H. W. Stevenson, E. H. Hess and H. L. Rheingold (New York: Wiley, 1967), pp. 249-277.

²Einar R. Siqueland and Lewis P. Lipsitt, "Conditioned Head-Turning in Human Newborns," Journal of Exper. Child Psych. 3 (1966): 356-376.

³Burton I. White, The Role of Experience in the Behavioral Development of Human Infants: Current Status and Recommendations (Bethesda, Md.: ERIC Document Reproduction Service ED 048 917, 1970), p. 39.

experience in real life. However, the fact that conditioning can be effectively used to shape behavior in infants has far-reaching implications for effective techniques in intervention programs.

Enrichment Studies

A group of experimental studies yielding important results are enrichment studies in which some condition is added to the infants' environment and the effect on the infants' subsequent behavior is monitored and compared with infants who did not receive the experimental treatment. The bulk of this type of research involved institutionalized infants primarily because of their accessibility and the fact that their environments could be more carefully controlled.

One of the earliest studies of this kind was that of Skeels and Dye.¹ In this study the experimental group consisted of thirteen nineteen month old institutionalized "retarded" infants who were transferred to an institution for mentally retarded girls where they were cared for by the patients and staff and received relatively high stimulation with much love and attention. Following a variable period of time in the second institution they were placed

¹H. M. Skeels and H. B. Dye, "A Study of the Effects of Differential Stimulation on Mentally Retarded Children," Pro Amer. Ass. Ment. Defic. 44 (1939):114-136, cited by H. M. Skeels, "Adult Status of Children with Contrasting Early Life Experiences," Monograph of the Society for Research in Child Development, 31 (1966):1-65.

in adoptive homes. The control group, consisting of twelve infants of initially higher intelligence, remained in the orphanage where they were exposed to a nonstimulating environment over a prolonged period of time. Two years after the transfer, the experimental group made an average gain of twenty-nine IQ points while the control group showed an average loss of twenty-six IQ points.

In a follow-up study¹ after a lapse of thirty years, all cases were located and information obtained on them. The results are remarkable. Of the thirteen subjects in the experimental group, all were self-supporting and none were wards of the state. Educationally, they completed a median of twelfth grade, four having completed one or more years of college work, one received a B. A. degree with some graduate training. Eleven of the group were married. They had a total of twenty-eight off-spring none of whom showed evidence of mental retardation or any abnormality. The control group fared less well. Four were still wards of institutions, one died in residence of an institution for the mentally retarded. They completed a median of less than third grade. Only two had married, one had a nice home and was the father of four children of average intelligence, the other was subsequently divorced.

¹Skeels, "Adult Status of Children with Contrasting Early Life Experiences."

Sayegh and Dennis¹ working with infants in the Creche orphanage in Beirut, Lebanon, hypothesized that the retardation of the infants was largely due to poverty of experiences and that by providing supplementary experiences they could improve the infants' functioning. They divided a group of thirteen infants between the ages of seven and eighteen months (none of whom could sit unaided) into an experimental and control group. The experimental group was given supplementary experiences designed to accustom them to an upright position, to encourage interest in objects and to develop skill in object manipulation one hour per day for fifteen days over a three-week period. In one month the experimental group made a mean gain in developmental age on the Cattell Scales that was more than four times the average increase per month compared to the pre-experimental period. The control group gained less than the experimental group but more than they had gained per month in the pre-experimental period. The authors point out that a contaminating factor was their inability to control the amount of handling the infants received. The infant caretakers watched the experiment and gave some of the same supplementary experiences to the control group.

¹Yvonne Sayegh and Wayne Dennis, "The Effect of Supplementary Experiences Upon the Behavioral Development of Infants in Institutions," Child Development 36 (1965): 81-90.

Casler¹ designed an experiment to test the hypothesis that institutionalized infants who received added tactile stimulation by stroking the middle part of the body for two ten-minute periods five days a week over a ten-week period would function at a higher level as measured by the Gesell Developmental Schedule than institutionalized infants who received no extra tactile stimulation. The results were in the expected direction, with the experimental group scoring higher in terms of total developmental quotient and on scores of language, adaptive, and personal social subtests. No significant difference was found between the two groups on the motor subtest although the difference was in the expected direction.

One of the most persuasive series of studies showing that enrichment procedures can produce remarkable effects on the course of early development was conducted by White² over an eight-year period dealing with institutionalized infants one to six months of age. The first modification of rearing conditions that White was concerned with was the effect of extra handling on subjects who normally receive minimal amounts. From day six through thirty-six,

¹Lawrence Casler, "The Effects of Extra Tactile Stimulation on a Group of Institutionalized Infants," Genet. Psychol. Monograph 71 (1965):137-175.

²Burton White, "Informal Education During the First Months of Life," in Early Education: Current Theory, Research, and Action, eds. Robert Hess and Roberta Bear (Chicago: Aldine Publishing Company, 1968), pp. 143-170.

nurses administered twenty minutes of extra handling daily. Measures of overall development were taken regularly between days thirty-seven and one hundred and fifty-two. The only significant difference found in any developmental process was that the handled group was more visually attentive than the control group.

The next concern was the effect of heightened motility in an enriched surround on visual motor development. The experimental group received increased tactual-vestibular stimulation through twenty minutes of extra handling daily from day six through thirty-six; increased motility by being placed in a prone posture for three fifteen-minute periods daily from day thirty-seven through day one hundred and twenty-four with the crib pads removed, making ward activities visible to the infants; and enriched visual surround by suspending a special stable of highly contrasting colors and numerous forms over the infants. In the experimental group, although the onset of hand-regard behavior was delayed two weeks, top level reaching was accelerated some six and one half weeks and visual attention was altered dramatically.

Further modification of the environment through placement of two pacifiers attached to a red and white pattern mounted to the crib rail was made with the assumption that the pacifiers might orient the infant toward

discovery of his own hands. This was the only modification made from days thirty-seven to sixty-eight. At sixty-eight days, the infant was placed in a crib with a stable until he was one hundred and twenty-four days of age. The experimental group exposed to these conditions exhibited accelerated hand-regard and top level reaching at less than three months, significantly earlier than controls.

These studies demonstrate that the age range from one and one half to five months is a time of enormous importance for early perceptual motor development and that aspects for early visual motor development are extremely plastic. The onset of hand-regard, visually directed reaching, and the growth of visual attentiveness are significantly affected by environmental modification making developmental age norms almost meaningless without knowledge of the infants' experiential background.

Field Studies

Based on the growing evidence that early experiences influence later academic achievement, intervention programs for vulnerable infants began to emerge in the latter half of the 1960's. For the most part, these projects have dealt with an attempt to optimize the development of the culturally disadvantaged infant. Nevertheless, they provide a rich source of information that can be applied

to intervening with children who are vulnerable to delay for reasons other than environmental. This section investigates the methods and effectiveness of precluding poor early development of vulnerable infants by surveying the results of longitudinal field research projects where, according to White, ". . . very able people translate out best hunches into actual attempts to improve the development of groups of infants, then upgrade their programs through repeated evaluations."¹

Intervention Models

Different approaches to the type of intervention delivery systems have been used by different projects. Longitudinal data are beginning to trickle in suggesting that the degree of involvement of the mother or primary caretaker in the program is an important factor in the effectiveness of the intervention. The following strategies are discussed and have been categorized according to the degree of mother involvement in the program:

Child-centered, Tutorial Model - Within this strategy, trained child development personnel, most often within a home setting, attempt to extend the range of experience and competence of an infant. The tutor works directly with the infant with little or no parent involvement.

Mother-centered Model - This strategy is characterized by the discussion of intervention techniques and information supportive of child development with groups of mothers who then return home and work with their own infants.

¹White, The Role of Experience, p. 57.

Family-centered, Home-visit Model - Within this model, trained home visitors (of varying backgrounds: teachers, nurses, social workers, neighborhood mothers) go into the home and offer supportive suggestions and demonstrations to enhance and stimulate development concentrating on the mother-child dyad.

Family-centered, Combination Model - This model combines to varying degrees a center-based program such as a day care center, nursery school, or a clinic with different methods of parent involvement. Included in this model is a trans-disciplinary approach in which an entire team pools its knowledge and expertise in terms of evaluating, program planning, and implementation working with the parent who remains the primary teacher of the infant.

Center-based, Ecological Intervention Model - This type of intervention involves removing the child from his home for most of his waking hours, placing him in an environment conducive to growth, and entrusting his development to persons specifically trained for the job. It also involves attempting to effect changes in the context in which the family lives and has been used when the infant's environment does not provide substantial opportunity and support for the parent-child interactive processes.

Child-centered Tutorial Model

Painter¹ and Schaefer² employed programs where a trained tutor came to the home one hour daily, five days a week during a one and one and a half year period respectively, working with the infant using a structured language and cognitive developmental curriculum. In Painter's program, mothers were not involved. In fact it was

¹Genevieve Painter, Infant Education (San Rafael, California: Dimensions Publishing Co., 1968).

²Earl S. Schaefer, Progress Report: Intellectual Stimulation of Culturally-deprived Parents, National Institute of Mental Health, 1968, cited by Bronfenbrenner, A Report on Longitudinal Evaluations.

recommended at the end of the program because of some of the problems encountered in the home-tutoring set-up that a center-based program might be more desirable where organized care and propitiously structured living routines could be given. In Schaefer's program participation of mothers and other family members was encouraged but not built into the experimental design. At the termination of both studies, significant differences in IQ were found between experimental and matched control groups suggesting that intervention was effective. However, when one looks at the follow-up data on entry into first grade available on the children in Schaefer's study (not available for Painter) the effects of the early intervention appear to "wash out" with time. Immediately after intervention, there was a sixteen-point difference in IQ between the experimental and control groups; by age four, the IQ for both groups dropped with the difference between the groups lessening and by the time the children reached first grade, there was only a four-point difference in IQ score in favor of the experimental group with no difference in achievement levels.¹

Disappointed with the results of his program and having noted that tutoring affected the behavior of the

¹Ibid., p. 22.

mother as well as the child, Schaefer¹ analyzed the relation between patterns of mother-child interaction during the tutoring session and the IQ obtained by the child after intervention. He found a cluster of variables that was negatively correlated with IQ and ratings of the child's task-oriented behavior including such factors as withdrawal of relationship, hostile detachment, low interest in the child's education, low verbal expressiveness, and low involvement with the child. He concluded that the relationship between a mother's acceptance of the child and her educational efforts is positively correlated with the relationship between the child's competence and his adjustment. This conclusion has led him to advocate early and continuing education which should be family-centered rather than child-centered. He supports programs designed to increase the adequacy of family-centered education throughout the period of child development.²

Mother-centered Model

Practically the antithesis of the child-centered approach was taken by Karnes³ at the University of Illinois

¹Earl S. Schaefer and M. Aaronson, "Infant Education Research Project: Implementation and Implications of the Home-tutoring Program," in The Preschool in Action, ed. R. K. Parker (Boston: Allyn and Bacon, 1972), pp. 410-436.

²Earl S. Schaefer, "Need for Early and Continuing Education," in Education of the Infant and Young Child, ed. Victor H. Denenberg (New York: Academic Press, 1970), p. 78.

³Merle Karnes, et al., "Educational Intervention at Home by Mothers of Disadvantaged Infants," Child Development 41 (1970):925-935.

in an experimental program which recruited twenty mothers with infants between the ages of twelve and twenty-four months from an economically depressed environment for intervention over a two-year period focusing on training mothers in effective techniques for optimizing their children's development. During the first year mothers met in two groups for weekly two-hour meetings divided between child-centered topics involving the presentation of educational toys and materials with appropriate teaching models and mother-centered topics with group discussion as a vehicle for attitude change. Staff members made monthly home visits to reinforce the teaching principles introduced at the meetings and to help mothers establish a positive working relationship with their babies. During the second year, fifteen of the original twenty mothers continued attending weekly two-hour meetings over an eight-month period with extensions of those initiated the first year.

Post intervention scores on the Stanford-Binet Intelligence Scale and the ITPA were compared with performances of children of similar family backgrounds with no intervention. Scores of six children in the intervention group were also compared to scores of their siblings taken prior to their mother's training for intervention. Matched controls and sibling controls had been tested with these instruments in connection with recruitment for a larger research project. On both standardized measures,

performances of the experimental group were significantly superior to those of the control group. On the Stanford-Binet, the intervention group scored a mean IQ of 106, sixteen points above the control group. On the ITPA, performances of the experimental group closely approximated its mean chronological age and that of the control group was nearly six months below. In the sibling comparison there was a significant twenty-eight point difference in IQ scores in favor of the group who were tested after their mothers were involved in the program; in fact there was no overlap in range of IQ scores between the two groups of siblings, with the experimental group ranging between 99 and 134 and the control group between 72 and 102.

Results endorse the effectiveness of the mother training program in altering in a positive way the development of the disadvantaged children before the age of three. Whether these gains are transitory or not is not known; however, programs which train the mother to serve as an agent for intervention hold the potential for developing her self-capabilities and sense of personal worth which are pivotal factors in effecting broader changes and "it may be that gains obtained by intervention through the mother that affect the child's total environment on a sustained basis will prove more stable and will be reflected in later competency."¹

¹Ibid., p. 934.

Family-centered, Home-visit Model

A home-based intervention strategy that concentrates on the mother-child dyad has been used by a number of projects with promising results.

In Levenstein's Verbal Interaction Project,¹ two-to-three-year old disadvantaged children were visited by trained social workers (called Toy Demonstrators) twice weekly for one-half-hour sessions. They demonstrated to the mothers, through a structured curriculum of verbalized play with the child using a kit of toys and books, how to interact verbally with the child to foster conceptual growth. Initial IQ on entry into the program was in the eighties and nineties, showing that this population was already functioning well below the national norms. Following intervention, five experimental groups in which age of entry into the program, length and intensity of intervention was varied were all functioning at national norm levels and were able to maintain superiority over controls three to four years after intervention had ended. Through experimental variation, Levenstein demonstrated also that neither a friendly visit nor the provision of instructional materials was sufficient by itself to produce the major effect. The critical element involved inducing interaction between mother and child around a common activity.

¹Phyllis Levenstein, "Cognitive Growth in Preschoolers Through Verbal Interaction with Mothers," American Journal of Orthopsychiatry, 40 (1970):426-432.

In a service delivery program replicating the Verbal Interaction Project¹ yearly groups of about thirty children consistently achieved an average IQ gain of about seventeen points after two years in the program and tended to retain their gains into early school years.

The Ypsilanti-Carnegie Infant Education Project² involved eighty-eight economically disadvantaged families from Ypsilanti, Michigan, whose children entered an intervention program at three, seven, or eleven months. The participants were randomly divided into three different groups: experimental, contrast, and control, all of whom were in the program over a sixteen-month period. In the experimental group, a professional staff member made weekly home visits to assist and support the mother in her role as teacher of her infant using activities from a cognitive curriculum developed for the project based on Piaget's theories of cognitive development. In the contrast families, weekly home visits were made by student volunteers not formally trained in infant curriculum but who engaged in informal, intuitive, play activities while

¹Phyllis Levenstein, et al., "From Laboratory to Real World: Service Delivery of the Mother-Child Home Program," American Journal of Orthopsychiatry 43 (1973):72-78.

²Dolores Z. Lambie, James T. Bond, and David P. Weikart, Infants, Mothers, and Teaching: A Study of Infant Education and Home Visits, Summary of Final Reports, Ypsilanti Carnegie Infant Education Project (Ypsilanti, Michigan: High/Scope Educational Research Foundation, 1974).

the mothers observed. The control families were merely visited every four months by data collecting staff for testing. At the end of the project, as well as one year later, the experimental group showed normal intelligence somewhat above the standardized population mean. There was no evidence in any of the groups of cognitive deficits commonly reported in studies of disadvantaged children. The authors suggest that because the control group mothers considered the interviews and testing as a valuable service they cannot be thought of as an untreated group, and the phenomenon of what might be called the "climbing control group" resulted from the self-selection of families in terms of their motivation to provide educational experiences for the child.¹ In terms of the effects of the experimental treatment on mothers, it appears as if their child-rearing practices began to approach those of the mothers of competent infants described by White.² They became more observant of their infants and better able to understand the developmental significance of their activities. They began to take advantage of naturally occurring situations to support and extend child initiated activities. Their general interest in education tended to increase and they

¹Bronfenbrenner, A Report on Longitudinal Evaluations, p. 21.

²White, Experience and Environment.

became more involved in the education of their older children. Their childrearing strategies relied increasingly on providing opportunities for their infants to explore and master their environment and less upon negative, controlling behavior.

As part of the Florida Parent Education Early Education Projects¹ which have been underway since 1966, paraprofessionals were sent weekly into the homes of indigent families from twelve Florida counties to demonstrate to the mother specially designed developmentally sequenced activities. The age of entry and length of exposure to the program was varied. In some families, home visiting began shortly after the infants were born and in other groups intervention was begun when the infants were one, two, or three years. The home visiting continued for one, two or three years. The Stanford-Binet Intelligence Test was administered to all subjects at the age of five. Gordon found that all the groups except those who had participated in home visits for the second year only were significantly superior to the control group who received no intervention. The fact that the group that was visited from twelve to twenty-four months scored lower than the control group is puzzling. A number of hypotheses were made, one being that

¹Ira Gordon, The Florida Parent Education Early Intervention Projects: A Longitudinal Look, Institute for Development of Human Resources, Research Reports (Gainesville, Florida: College of Education, University of Florida, 1973).

curriculum devised for that year may not have been appropriate for the age group for which it was designed. Nevertheless as Gordon points out, "Of critical importance is the fact that we are able to demonstrate four years later, the effects of a minimal intervention program in the first year of life."¹

Although the majority of intervention projects have been concerned with the population of infants at environmental risk the results of two projects focusing on the mother-child dyad are available that involve children who are vulnerable to developmental delay for varying other reasons.

In the Portage Project,¹ seventy-five children from early infancy through five years of age with varying degrees of handicaps, all of whom scored well below age norms on developmental scales, were visited at home over a nine-month period. Every week each parent was given a series of specific behavioral items to work on with their child and were taught how to keep good behavioral records. The home visitor checked the child on the tasks the parent had worked on the previous week and added new ones appropriate to their developmental level. At the end of eight months

¹Ibid., p. 20.

²Marsha Shearer and David Shearer, "The Portage Project: A Model for Early Childhood Education," Exceptional Children (Fall 1972):210-217.

the children had gained about thirteen months of mental age which is about sixty percent more gain than would be expected based on their entering IQ. Furthermore, the children's gains were maintained after the home visits stopped, suggesting that the parents continued with their increased level of stimulation.

Another project involving high risk infants was conducted by Scarr-Salapatek and Williams.¹ This program involved a course of intervention on disadvantaged infants whose birth weight was less than 2.5 kg. Intervention was begun as soon as the newborn entered the premature nursery. Thirty low-birth-weight infants born between November, 1968, and November, 1969, were assigned to experimental and control groups. These infants had low Apgar scores, many suffered mild to severe respiratory distress and remained in the hospital an average of six weeks, two and one half of which were spent in an isolette. For the experimental group, the nursery staff was instructed to provide special visual, tactile, and kinesthetic stimulation approximating good home conditions. The twenty-four hour day consisted of eight one-half-hour stimulation sessions and approximately twenty hours in the isolette. The control group received standard pediatric care for low-birth-weight infants which involved being maintained in isolettes and

¹Sandra Scarr-Salapatek and Margaret Williams, "Effects of Early Stimulation on Low-Birth-Weight Infants," Child Development 44 (1973):94-101.

fed and changed with minimum disturbance. The experimental group continued stimulation through the first year with a weekly home visitor program which consisted of instruction and demonstration by a social worker in stimulating child care. Mothers were also trained to become better observers of their children's development so they could initiate games to play which would promote "next steps" in development. Assessment at four weeks on the Brazelton Cambridge Newborn Scales gave the experimental group a slight significant advantage and at one year, on the Cattell Infant Scale, the experimental group was at nearly normal levels of development while the control group remained one standard deviation below the norm for developmental status.

Family-centered, Combination Model

With the awareness that when most child-centered intervention programs cease, the children from multi-problem families are soon found to be indistinguishable in intellectual functioning from their peers, the Family Development Research Program was undertaken at Syracuse University Children's Center providing both a home-visitation program focusing on the mother-child dyad and a day care nursery school for infants.¹ Involved in the program

¹J. Ronald Lally, "The Family Development Research Program: A Program for Prenatal, Infant, and Early Childhood Enrichment, Progress Report," College for Human Development, Syracuse University, Syracuse, New York (March 15, 1974). (Mimeographed).

were 108 low-income, multi-problemmed families. The program was divided into three components. The first was prenatal services consisting of weekly home visits made by paraprofessional to expectant parents three to six months before the birth of the child and continuing the whole time the child was in the program. The purpose of the visits was to help mothers understand nutritional needs and to demonstrate ways to nurture child development after birth. The second component was the Infant Fold for children six to twenty-four months of age. It consisted of a center-based half-day program where four infants were assigned to one caretaker for "special loving care, cognitive and social games, and language stimulation."¹ In the third component or Toddler Group, children twenty-four to sixty months attended a full day, multi-age, group experience modeled after the British Infant School.

A longitudinal comparison study was begun when the program children reached thirty-six months of age at which time program families were matched to a low-educational control group and to a high-educational contrast group. On Stanford-Binet IQ scores at thirty-six months, the experimental group had a mean score of 111 which was significantly higher than the low-educational control group score of 99. It is interesting to note that the group with

¹Ibid., p. i.

prenatal intervention scored higher than the group that began intervention at six months.¹ The low-educational control group closely approximated the normal distribution on the Stanford-Binet, whereas none in the experimental group fell below the average range of intelligence and fifty-five percent scored at 110 IQ or better. The high-educational contrast group scored significantly higher than both the experimental or control groups. The Inventory of Home Stimulation (STIM) was used as part of parent functioning assessment with results following the same pattern of Binet data, namely the mean STIM score for the contrast group was significantly higher than the other two groups and the experimental group scored significantly higher than the control group. The total STIM score was correlated with the Binet score to see if there was a link between the amount of stimulation in the home and the child's performance on the cognitive tests. Since there was less of a correlation for the experimental group than there was for either the control or contrast groups, the assumption was made that participation in the center program partially over-rides home stimulation.²

¹John A. Maurelli and J. Ronald Lally, "The Effects of a Home Visitation Program on the Development of Disadvantaged Infants During the First Six Months of Life," paper presented at the annual meeting of the Early Child Care Committee of the American Public Health Association, Atlantic City, New Jersey (November 12-16, 1972). (Mimeographed).

²Lally, "The Family Development Research Program," p. 9.

Another longitudinal project that incorporated a center based program with parent involvement was the Infant, Toddler, and Preschool Research and Intervention Project at the Institute on Mental Retardation and Intellectual Development, a unit of the John F. Kennedy Center for Research on Education and Human Development at the George Peabody College for Teachers, Nashville, Tennessee.¹ The program has attempted to integrate an equal number of delayed children from three months to four years with varying handicaps with their normal peers, hoping that the nondelayed children could serve as appropriate developmental models.² A major goal of the project has been to focus on early entry of children into a program to assist the parent in establishing an effective training environment before much of the critical developmental period is past and formation of many unwanted responses has occurred, the philosophy being that the success of any intervention program with a group of moderately to severely handicapped children will depend on the involvement of the child's caretaker in the program.

¹Diane Bricker and William Bricker, Toddler Research and Intervention Project: Report - Year I and Year II, IMRID Behavioral Science Monograph, nos. 20 and 21 (Nashville, Tennessee: Institute on Mental Retardation and Intellectual Development, George Peabody College for Teachers, 1971-72); Bricker and Bricker, Infant, Toddler, and Preschool Project: Year III.

²Bricker and Bricker, Toddler Research Project: Year I.

In the third year of the project, after trying various methods of parent involvement, a parent advising component was developed with three goals: to provide a system of training for parents to enable them to serve as effective educational change agents with their children; to give the parents information necessary for them to mobilize as a citizens' group concerned about the opportunities available to handicapped children; and to explore with the parents the impact of having a delayed child. The mothers of delayed children were requested to spend at least one morning a week at the center where they met in small groups and individually for training in teaching strategies in language, cognitive, motor and social development and to work with their own children under supervision.

The project has no nonintervention control group. Therefore, no basis exists for comparing gains made by the children in the program until they reach first grade. Research is going on in the areas of language, cognition and parent training with the superordinate goal of developing programs that will maximize the development of heterogeneous groups of children in all critical domains of behavior.¹

¹Bricker and Bricker, Infant, Toddler, and Pre-School Project: Year III, p. 40.

A project that deserves mention even though results are not yet available is the United Cerebral Palsy Association's National Collaborative Infant Project involving five centers across the United States that were already servicing atypical infants under two years of age and their families.¹ Participants include the Meeting Street School in Providence, Rhode Island; a center in New Orleans, Louisiana, affiliated with the United Cerebral Palsy Association; the Agency for Infant Development in Kentfield, California; and two centers affiliated with universities, one at the University of California in Los Angeles, and the other, with the University of Iowa at Iowa City. These centers are attempting to pool their knowledge to identify and demonstrate effective ways of dealing with the atypical infant in terms of the service delivery system, curriculum development, and parent and family involvement. The multiple dysfunctions of the infants involved in the program have led to special considerations in the nature and organization of the intervention model. Fear that excessive or inconsistent handling involved in the traditional interdisciplinary approach would interfere

¹Una Haynes, "Overview of the National Collaborative Infant Project: A Nationally Organized Collaborative Project to Provide Comprehensive Services to Handicapped Infants and Their Families," in Allied Health Approaches, pp. 36-38.

with the formation of normal attachments between the atypical infants and their parents has led to the evolution of the transdisciplinary approach. While the collaborating centers are staffed with representatives from a variety of professional disciplines involved in the total habilitation of the baby, direct interventions by multiple members of the staff are kept to a minimum. Instead primary focus is placed on mobilizing the capabilities of the parents as the infant's primary teachers and therapists during the early months of life.¹ Parents are brought into the evaluation process and are taught how to observe and record their infant's behavior. In the program planning process, efforts are made to involve the parents in the decisions about methods, procedures, and materials that will be used to implement the program. One or two members of the interdisciplinary team work with the parent as facilitators in helping the parent implement the program. Preliminary findings suggest that use of the transdisciplinary model may be valuable.²

¹Ibid., p. 37.

²Una Haynes, "Comprehensive Services for Atypical Infants and Their Families," in Allied Health Approaches, p. 32.

Center-based, Ecological Intervention Model

In families where the conditions of life were such that it becomes difficult to meet the basic psychological needs of their children, a radical intervention program was conducted by Rick Heber¹ in the Milwaukee Project, which involved removing the child from his home for most of his waking hours and placing him in an environment conducive to his growth both physical and cognitive. Forty black mothers all with IQ's of less than 75 and their newborns living in an economically depressed area of Milwaukee took part in the program. There were actually two intervention programs: one, a vocational rehabilitation program for mothers; the other, an infant intervention program "to provide an environment and a set of experiences which would allow each child to develop his potential intellectually as well as socially, emotionally, and physically."² The infant education program focused heavily on language and cognitive skills and on maintaining a positive learning environment for the children. The infants entered the center-based program at three months of age at which time a trained teacher (a paraprofessional selected from the same neighborhood as the child) was assigned to each child so that each infant was paired with one consistent mothering figure or "teacher". The children stayed

¹Rick Heber, et al., Rehabilitation of Families at Risk for Mental Retardation (Madison, Wisconsin: Rehabilitation Research and Training Center in Mental Retardation, University of Wisconsin, Madison, 1972).

²Ibid., p. 15.

at the center from 8:45 a.m. to 4:00 p.m. five days a week. A gradual shift was made to a group situation so that by the time the infants were between twenty and twenty-four months old they became part of a preschool program with a child-teacher ratio of approximately three to one. The design of the study called for comprehensive intervention until regular school entry at the age of six. At the time of the last published progress report in 1972, the original infants were about five and one half years old. Their IQ performance was compared with that of a matched control group who received no intervention (twenty of the original forty chosen). At one year of age, both groups had a mean score of just under 115; by two, the experimental group had risen to 120 and the controls dropped to 95; by five and one half, the mean IQ for the experimental group was 124 and for the control group, 94--a difference of thirty points.

In summary, it is evident that there is no one best strategy for intervention; the program must be designed to meet the particular needs of the group of infants that it is servicing. In terms of program cost, an economical approach for environmental risk infants would be a mother-centered model. However, Karnes¹ found in her

¹Karnes, et al., "Educational Intervention".

study that in terms of mental test scores and measures of performance in program activities, the children of the six mothers in the experimental group who worked full-time, uniformly fell below the children of mothers who were not employed full-time outside the home. For children of these working mothers a family-centered, combination model such as the Family Development Research Program at Syracuse University Children's Center which provided a day care nursery school for infants as well as a home visitation program would probably be more beneficial. In the home situation where deprivation is so severe that the child's basic needs are not being met, the most effective strategy would be ecological intervention as in the Milwaukee Project where the infant is able to form a stable relationship with his caretaker. For high risk and biological risk infants where the expertise of many disciplines (speech, motor, audiology, vision, etc.,) is needed in programming, a transdisciplinary model is showing promise as being effective.

Whatever strategy is used, careful attention must be paid to the mother-infant relationship. As Bronfenbrenner points out, "In the early years of life, the psychological development of the child is enhanced through his involvement in progressively more complex, enduring patterns of reciprocal contingent interactions with persons with whom he has established a mutual and enduring emotional

attachment."¹ In other words, when patterns of reciprocal interaction take place in an interpersonal relationship that endure over time, this leads to the development of a strong emotional attachment which then increases the motivation of the child to attend and to learn from that person.

Curriculum Development

"Despite the factors generating a preference for infancy as the important age to begin cognitive enrichment, few tried and tested curricula are available to infancy program directors."² However, some guidelines are beginning to be disseminated from the infant intervention research projects. Unfortunately, detailed descriptions of the curricula being used are not available in the professional journals but can usually be obtained by writing directly to the various projects involved. Curricula models that these projects are developing are discussed in this section.

Cognitive-Developmental Approach

A number of projects, namely the Florida Parent Education Early Education Projects, the Family Development

¹Bronfenbrenner, A Report on Longitudinal Evaluations, p. 26.

²Alice S. Honig and Sheila Brill, "A Comparative Analysis of the Piagetian Development of Twelve Month Old Disadvantaged Infants in an Enrichment Center with Others not in such a Center," enlarged version of a paper presented at the annual meeting of the American Psychological Association, Miami (September, 1970) (Mimeographed), p. 3.

Research Program at Syracuse University, the Infant, Toddler, and Preschool Research and Intervention Project at George Peabody College, and the Ypsilanti-Carnegie Infant Education Project, have taken an essentially cognitive-developmental approach to infant learning in which Piaget's conception of sensori-motor functioning and of the interactive process in the formation of increasingly more mature and complex cognitive structure provides the rationale.

"This approach connotes an effort to (1.) change the cognitive structures or processes available to the child, (2.) speed up the acquisition of these structures, and (3.) help generalize the applicability of a cognitive schema or structure to new sets of stimuli."¹ Components of a cognitive-developmental curriculum were influenced by an outline of infant activity units, in an instrument for assessing infant psychological development devised by Uzgiris and Hunt² based on Piaget's theories of cognitive development. They outlined the following areas of cognitive functioning and progressions toward mental representations of objects: permanence of objects, development of means for achieving desired environmental events, the development

¹Ibid., p. 7.

²Ina Uzgiris and Joseph McV. Hunt, "An Instrument for Assessing Psychological Development," Psychological Development Laboratory, University of Illinois, 1966. (Mimeographed).

of schemas in relation to objects, development of causality, construction of objects in space, development of vocal imitation, and development of motor imitation. (See Appendix A for clarification of terms.)

How this approach is translated into a curriculum for infants is demonstrated through the following description of the Syracuse Center's Infant curriculum.¹ Infant activities at the Syracuse Center are based on the assumption that only as an infant's basic needs for feeding, soothing, cuddling, resting, and exploring are met in a regular loving fashion can he become responsive to developmental tasks and games. Whenever possible, learning games are embedded in caregiving routines such as diapering, feeding, and bathing. The problem of the "match" between developmental level attained and the level of the task presented for each infant is stressed. The caregiver must therefore be knowledgeable in the developmental sequence and a sensitive observer of the infant's developmental level so she can arrange the environment and schedule to provide sequences of experiences that are suitably matched to the infant's developing characteristics.

¹Alice Honig, "The Family Development Research Program: With Emphasis on the Children's Center Curriculum," paper presented at the Nisonger Center, Infant Curriculum Conference, Ohio State University (June 1972). (Mimeographed).

Teachers are encouraged to talk to the babies a great deal, pairing words with the activities in which they are involved, labeling objects, responding to the baby vocalizations and babblings with pleasure, and encouraging the infants to imitate sounds and then words. The use of praise is stressed and the caregiver is encouraged to use body caresses, smiles, hand claps, verbal cheering on, and occasional "whirl-around-hugs" to express her pleasure at infant accomplishments of many kinds. The infant environment itself is arranged to nurture sensorimotor activities and explorations. Low toy shelves can be easily reached by creepers or toddlers so they can discover the potentialities of many items on their own; mobiles hanging from walls near diapering tables and wall mirrors at floor level encourage the infant's visual and tactual explorations.

The infant caretakers, with the help of the Program Supervisor, create activities around the basic curriculum components in terms of the provision of tender loving care along with Piagetian games, language encouragement, sensory experiences and opportunities for development of motoric, sociable, and self-help skills. (A brief outline of the components and activities the program emphasizes is included in Appendix B.)

The Infant curriculum thus emerges as a function of the total environment of materials, people, and also the locale in which the babies are cared for. The curriculum in this perspective is seen as related to all

aspects of the child's development. It consists not only of more formal or staged games and activities, but also of all the incidental learning experiences that can occur in a varied environment with loving personnel.¹

Eclectic Approach

In developing a curriculum many of the programs did as Painter did: utilized an almost eclectic approach "with ideas drawn from child development theory, and speculation, common sense, trial and error, and in some cases, intuition."² Basically the curricula are directed toward development of skill and placing order upon one's environment. As Gilmer, Miller, and Gray point out,

Evidence suggests that man strives to impose order and structure upon the environmental chaos in which he finds himself. More important there is evidence . . . that organizing and structuring skills are learned. As the child learns to impose order and structure upon his environment, he is able to process information much more economically and efficiently.³

Thus, the utilization of information processing theory concerned with the ability to receive information, code and store it, then retrieve and utilize it, was important to the development of a curriculum.

¹Ibid., p. 17.

²Painter, Infant Education, p. 124.

³Barbara Gilmer, James O. Miller, and Susan W. Gray, Intervention with Mothers and Young Children: A Study of Intrafamily Effects, DARCEE Papers and Reports, v. 4, no. 11 (Nashville, Tennessee, Demonstration and Research Center for Early Education, George Peabody College for Teachers, 1970), p. 14.

Since perceptual ability enables the infant to receive, identify, and interpret sensory impressions from his environment, one of the goals of the Heber study was to provide sufficient varied experience to enable the child to refine his perceptual ability. To accomplish this, variables in the six perceptual areas were manipulated as follows:

1. Kinesthetic: Vary the child's direction and speed of motion. Vary his position in space. Vary the stress placed on different muscles.
2. Auditory: Vary the sounds presented in pitch, volume, location, duration, tone, rhythm. Pair sounds with objects, sounds with animals, words with objects.
3. Visual: Vary objects by size, color, shape, position, distance, movement, direction.
4. Tactile: Vary objects by texture, temperature, flexibility.
5. Gustatory: Vary flavors, temperature, and consistency of foods.
6. Olfactory: Identify common smells.¹

Another goal of the project was to promote language development, helping the teachers prepare a climate conducive to language growth. It is important for the teacher or caretaker to know when to label objects, when to listen, when to repeat the infant's utterances, expanding upon them and replying to them. (Receptive and expressive language goals appear in Appendix C.)

With the assumption that a child's understanding of his surroundings is developed through physical interaction with his environment, through active exploration

¹Heber, Rehabilitation of Families at Risk, p. 22.

and manipulation of the environment and through trial and error problem-solving strategies, the following steps were taken to encourage and facilitate cognitive development:

1. A wide variety of manipulative problem-solving toys were available and accessible within the environment.
2. Teachers learned to view any situations, such as a ball rolling under a chair, as a potential problem solving experience.
3. Naturally developing motor skills were used to expand the child's experiences.
4. Since every activity is a learning experience for the child, daily routine activities were viewed as potential learning experiences.
5. The environment itself was organized to introduce a variety of interrelated concepts.¹

Shearer and his colleagues² developed a sequential check list of behaviors in the areas of cognition, self-help, motor, language, and socialization taken from a variety of preschool developmental scales and tests based on normal growth and development. The checklist can be used as a device to assess present behavior and also as a curriculum guide to promote increased skill. In other words, the checklist can help pinpoint where the child is on the developmental continuum and what behaviors are to be learned next. Corresponding to the behavioral checklist, a card file was developed with each card including the following information: (1.) the behavior as stated on the checklist, (2.) a behavioral

¹Ibid., pp. 26-27.

²Shearer, et al., The Portage Guide to Early Education: Instructions and Checklist, Experimental Edition, CESA No. 12 (Portage, Wisconsin, Cooperative Educational Service Agency).

description of the item including criteria for success, (3.) suggested materials to teach the behavior, and (4.) a list of activities or curriculum ideas on how to teach the behavior.¹

No matter what theoretical framework was used for developing an infant curriculum the following aspects were stressed:

1. Carefully sequencing activities according to a developmental continuum.
2. Matching the level of the activity to the developmental level of the child.
3. Breaking activities down into small sequential steps.
4. Providing some type of contingency management or reinforcement schedule.
5. Insuring exposure to varying sensory experiences.
6. Talking to the infants a great deal, describing actions and objects and encouraging the infants' vocalizations.
7. Arranging the environment to encourage sensorimotor activities and explorations.

Summary

In order to determine what changes should be made in the environment of the infant (vulnerable to developmental delay) to optimize development, and how those changes affect the infant's later development, this chapter reviewed the following types of studies: (1.) correlational studies to isolate and identify experiences important for nurturing development during the first years of life; (2.) experimental

¹Ibid., p. 8.

studies including both conditioning and enrichment studies in which some aspect of the infant's environment is manipulated or some condition is added to the infant's life and the resulting effects on development noted; and (3.) field studies to survey the methods and effectiveness of programs intervening early in the lives of infants vulnerable to delay, focusing on service delivery strategies and models of curriculum development.

CHAPTER III

CONCLUSION

This paper began with the assumption that early experiences are important to later cognitive development. Thus, to optimize the development of vulnerable infants, who because of their vulnerability may have experiential deficits, intervention should begin as early as possible. In order to develop programs of intervention it addressed itself to the questions: (1.) What experiences are important to later cognitive development? (2.) What should the environment and infant caretakers provide? (3.) How can the environment of the child be structured to maximize the likelihood of optimal development? The paper also surveyed the methods and effectiveness of the programs already in existence.

In general there is a lack of information on what, where, how, and under what circumstances children actually learn. Two alternative approaches can be taken to fill the gap. The first is to work on the problem of building a base of knowledge oriented toward the problem of understanding the laws of optimal development. The other approach is to plunge right into intervention work.

Attempts are being made through correlational studies to isolate and identify experiences that are important for nurturing early development by examining the relationship of contrasting environments and childrearing practices with developmental outcome. Results suggest that certain environments are more supportive of nurturing development and competence than others with essential elements being: (1.) a responsive environment in which an infant can bring about reinforcement through his actions; (2.) a non-restrictive environment that provides a variety of sensory experiences; (3.) an environment with a warm, stable, reciprocal infant-caretaker relationship; and (4.) an environment that provides a high degree of verbal interaction.

Experimental studies in which some aspect of the infant's experience is manipulated and the resulting effect observed, demonstrate that development is extremely plastic. Infant vocalizations can be increased through auditory and tactual reinforcement, developmental scores enhanced by extra handling, reaching behavior accelerated by enriching the visual surround, developmental retardation of institutionalized infants alleviated in some respects by enriching drab surroundings, by providing toys, interesting sights and sounds, and free opportunity for age appropriate experiences. However, these studies tended to be monotopic in that a single phenomenon had been selected for study and then carefully documented. The disparate studies have to be integrated into a meaningful pattern for understanding the dynamics of infancy.

It has been said that compensatory educational projects are based more on perceived need than real information about the nature of infant learning.¹ However, society is faced with pressing needs and cannot wait for all the answers before attempting programs. By repeated evaluations, followed by upgrading programs and disseminating the findings, these projects perform an invaluable service both to the infants they service and to further basic knowledge in infant development.

This paper has surveyed the infant intervention field studies focusing on service delivery strategies and models of curriculum development. In general, results suggest that there is no one best strategy for intervention, but the program must be designed to meet the particular needs of the group of infants it is servicing. Whatever strategy is used, a key element in the effectiveness of the program is the degree of attention paid to the involvement of the parent or primary caretaker in the program and the parent-infant relationship. During the first three years of life, a primary objective is:

The establishment of an enduring emotional relationship between parent and infant involving frequent reciprocal interaction around activities which are challenging to the child. The effect of such interaction is to strengthen the bond between parent and child, enhance motivation, increase the frequency and power of contingent

¹E. R. LaCrosse, et al., "The First Six Years of Life: A Report on Current Research and Educational Practice," Genetic Psychology Monographs 82 (1970):186.

responses, produce mutual adaptation in behavior, and thereby improve the parent's effectiveness as a teacher for the child, further the latter's learning, and, in due course, establish a stable interpersonal system capable of fostering and sustaining the child's development in the future.¹

In surveying the curricula used in the various projects, the following aspects were common to all and can be thought of as guidelines for programming.

1. Carefully sequence activities according to a developmental continuum.
2. Match the level of the activity to the developmental level of the child.
3. Break activities down into small sequential steps.
4. Provide some type of contingency management or reinforcement schedule.
5. Insure exposure to varying sensory experiences.
6. Talk to the infants a great deal; describe actions and objects and encourage the infants' vocalizations.
7. Arrange the environment to encourage sensori-motor activities and explorations.

The field of early intervention is in its infancy and short term effects look promising. However, as Caldwell² suggests, the intervention projects have major obligations. Mandatory follow-up is needed in order to determine conclusively the effects of intervention over extended time. There must be some type of continuity between early intervention and subsequent educational endeavors. There is a

¹Bronfenbrenner, A Report on Longitudinal Evaluations, p. 56.

²Bettye M. Caldwell, "The Rationale for Early Intervention," Exceptional Children 36 (1970):717-726.

need for more program description to answer what kind of intervention produces what kind of effect in what kind of child. Very little of this type of information is entering the professional journals.

APPENDIX A

CLARIFICATION OF PIAGETIAN CONCEPTS¹

Permanence of Objects

Visual experiences with objects contribute to the notion of independently existing objects. The infant progressively maintains interest in an object no longer in sight, searches for a hidden object, and develops a mental representation or image of an object. The increasing development of mental representation of objects is evidenced in the persistence of the infant in searching for a hidden object.

Development of Means for Achieving Desired Environmental Events

Progresses from directing eyes and a hand toward an object to intentional eye-hand coordination and grasping of an object. As the infant distinguishes between objects as means or ends, he is able to use objects such as a string or a stick as a tool for obtaining another object. The increasing development of mental representation of means is evidenced in learning a new task rapidly, and foresight as evidenced by no apparent trial and error before successfully solving a problem.

Schema Development

The development of schemas in relation to objects, refers to the behaviors the infant shows to objects. Reactions to objects include mouthing, looking, hitting, banging, tapping, shaking, patting, feeling, and examining them. Other motor schemas include tearing, stretching, sliding, crumpling, dropping, and throwing objects. Social schemas toward objects develop from imitation and greater social awareness. The infant uses an object like he has seen another person use it, and he wants to show the object to someone. The increasing development of mental representation is evidenced in the naming of objects that he recognizes.

¹Bettye Forrester, et al., Materials for Infant Development, DARCEE (Nashville, Tennessee: John F. Kennedy Center for Research on Education and Human Development, George Peabody College for Teachers, 1971), pp. 4-6.

Development of Causality

The infant attempts to keep an interesting activity going or to restart an interesting activity, such as the movement of a wind-up toy. He progresses from no reaction to the termination of an activity to random hand movements, followed by appeals to another person, direct action on the object, and mechanical activation of the object. The development of causality means that the infant is able to examine interesting situations for objective causes and start to try to reproduce the interesting results through objective means.

Construction of objects in Space

The infant develops the notion of a recognizable object or objects as things. He finds an object upon hearing its sound, he can follow a moving object, and he recognizes the reverse side of an object. He understands that objects can be put in a container, blocks can be stacked, a toy can roll down an incline, and dropped objects can fall in different ways. The increasing representation of objects in space is evidenced by the infant's ability to make detours. . . . and he recognizes the absence of familiar persons by vocalizing of their absence or pointing outside.

Development of Vocal Imitation

The infant progresses from cooing and babbling to imitating the sound patterns and the words of persons around him. The number of words increases Mental representation is evidenced in the naming of objects that he recognizes.

Development of Motor Imitation

The infant progresses from imitating simple gestures to imitating more complex actions, and from imitating unfamiliar gestures he can see to imitating unfamiliar gestures which he cannot see himself perform. Representation is implied by the imitation of invisible gestures.

APPENDIX B

CHILDREN'S CENTER, SYRACUSE UNIVERSITY

INFANT CURRICULUM¹

1. Development of prehension skills.
 - a. Reaching for toys.
 - b. Shaking toys.
 - c. Hitting suspended toys.
 - d. Pulling suspended toys.
 - e. Squeaking toys.
 - f. Grasping and handling objects of different sizes and shapes.

2. Development of object permanence: Concept that an object exists independent of a child's own actions.
 - a. Playing peek-a-boo.
 - b. Horizontal following of toys.
 - c. Finding toys after visible displacements under screens.
 - d. Finding toys after invisible displacements under screens.
 - e. Putting toys into containers and finding toys under containers.

3. Development of means for achieving desired environmental ends: Using objects as instruments in attaining goals.
 - a. Reaching over obstacles for toys.
 - b. Using a support, such as a pillow, to obtain a toy placed on top of the support, but out of the child's reach.
 - c. Using a string horizontally to obtain a toy tied to the string.
 - d. Using a string vertically to obtain a toy tied to the string.
 - e. Putting a chain into a box.
 - f. Using a stick to obtain an object.

¹Honig, "Family Development Research Program," pp. 12-15.

4. Development of new schemas in relation to objects: Finding ways of acting on objects and of using toys and materials appropriately.
 - a. Hitting two toys together.
 - b. Patting a toy animal.
 - c. Making a doll walk.
 - d. Stretching an elastic bracelet.
 - e. Throwing toys.
 - f. Adorning oneself with a pop-it bead necklace.
 - g. Drinking from a cup.
5. Development of causality: Forming a distinction between act and external result.
 - a. Bringing an unseen object to sight.
 - b. Ringing a bell to make a sound.
 - c. Turning a key to make a mechanical toy run.
 - d. "Zooming" a friction car to make it go.
 - e. Working a Jack-in-the-box.
6. Developmental achievement of the construction of the object in space: Conceiving of a single, objective space within which all objects are contained and interrelated.
 - a. Finding a toy by its sound.
 - b. Following the trajectory of a toy.
 - c. Bunching a chain and putting it into a box.
 - d. Nesting several boxes.
 - e. Rolling objects down a plane.
 - f. Creeping around a barrier, such as a rocking chair, to retrieve a ball rolled underneath the chair.
7. Development of gestural imitation.
 - a. Imitating a familiar visible gesture, such as pat-a-cake.
 - b. Imitating an unfamiliar visible gesture, such as crooking a finger.
 - c. Imitating a familiar invisible gesture, such as tilting the head back and forth.
 - d. Imitating an unfamiliar invisible gesture, such as an eye wink.
8. Development of verbal learning.
 - a. Imitating baby sounds.
 - b. Imitating unfamiliar sounds, such as "la-la".
 - c. Labeling objects, people, feelings, actions, places, times, questions, and directions.
 - d. Listening to stories.
 - e. Carrying out verbal requests with appropriate gestures.

9. Physical development and exercises.

- a. Stretching and flexing legs.
- b. Rolling body into a ball.
- c. Rocking on the stomach.
- d. Doing somersaults.
- e. Bouncing the body to music.
- f. Bending to pick up objects.
- g. Pulling up on heavy furniture.

10. Development of sense organs.

- a. Producing and listening to sounds
(music boxes, rattles, wrist bells, records, tapes, etc.).
- b. Producing tactual experiences
(feel boxes, fur collars, nylon net, styro-foam, etc.).
- c. Producing kinesthetic experiences
(swinging, tickling with a feather, running a hair brush along the arm, etc.).
- d. Producing visual experiences
(looking at pictures, books, mobiles, etc.).
- e. Tasting new foods and new textures of familiar foods.

APPENDIX C

LANGUAGE GOALS¹

Receptive Language Goals

To develop listening skills (the ability to attend to, to recognize, and discriminate between various auditory stimuli):

1. To help the child to orient toward auditory stimuli.
2. To help the child attend to the human voice.
3. To aid in the recognition of familiar sounds.
4. To help the child discriminate and match sounds.
5. To help the child discriminate specific auditory stimuli against a background of extraneous sound.
6. To develop an awareness of differences in pitch and volume.
7. To foster attention to duration and sequence of sound.
8. To develop listening skills in relation to books.

To develop awareness that words convey meaning:

1. To elicit an appropriate response in conjunction with the presentation of familiar objects.
2. To increase receptive vocabulary by repeated pairings of objects and their labels.
3. To elicit a response contiguous with the presentation of familiar words.
4. To develop the ability to follow simple directions.
5. To develop word "memory".

To develop receptive vocabulary:

1. To introduce the parts of the body.
2. To introduce the labels of objects in the environment.
3. To introduce number words and their sequence.
4. To introduce amount concepts (more, all gone, full, empty).
5. To introduce size concepts (big - little).
6. To introduce position concepts (up - down, on - off, open - shut, in - out, under - over).

¹Heber, Rehabilitation of Families at Risk, pp. 25-26.

7. To introduce shape concepts (circle, square).
8. To introduce color concepts.
9. To introduce time concepts (now, today, lunch time, nap time, time to go home).
10. To introduce the concept of "oneness and twoness".

Expressive Language Goals

To increase the expressive use of language:

1. To encourage the imitation of sounds.
2. To encourage spontaneous speech.
3. To encourage the imitation of syllables and words.
4. To encourage the pairing of words and gestures.
5. To develop a small meaningful vocabulary.
6. To develop the ability to express needs.
7. To develop the ability to participate in simple songs and finger plays.
8. To develop the ability to put two or more words together.

BIBLIOGRAPHY

SELECTED BIBLIOGRAPHY

Books

- Ambrose, Anthony. Ed. Stimulation in Early Infancy. London: Academic Press, 1969.
- Bloom, Benjamin S. Stability and Change in Human Characteristics. New York: John Wiley and Sons, 1964.
- Denenberg, Victor H. Ed. Education of the Infant and Young Child. New York: Academic Press, 1970.
- Escalona, Sibylle K. The Roots of Individuality: Normal Patterns of Development in Infancy. Chicago: Aldine Publishing Company, 1968.
- Hellmuth, Jerome. Ed. Exceptional Children Vol. I The Normal Infant. New York: Brunner/Mazel, 1967.
- Hess, Robert and Bear, Roberta. Eds. Early Education: Current Theory, Research and Action. Chicago: Aldine Publishing Company, 1968.
- Hunt, Joseph Mc V. Intelligence and Experience. New York: Ronald Press, 1961.
- Painter, Genevieve. Infant Education. San Rafael, California: Dimension Publishing Company, 1968.
- Parker, R. K. Ed. The Preschool in Action. Boston: Allyn and Bacon, 1972.
- Piaget, Jean. The Origins of Intelligence in Children. New York: Ballentine Books, 1954.
- Provence, Sally A. and Lipton, Rose C. Infants in Institutions. New York: International Universities Press, 1962.
- Richardson, F. Ed. Brain and Intelligence, The Ecology of Child Development. Baltimore, Maryland: National Educational Press, 1973.

- Stevenson, H. W., Hess, E. H., and Rheingold, H. L. Eds. Early Behavior. New York: Wiley, 1967.
- Stone, L. Joseph, Smith, Henrietta T., and Murphy, Lois B. Eds. The Competent Infant. New York: Basic Books, 1973.
- White, Burton and Watts, Jean C. with Barnett, Itty C., Kaban, Barbara T., Marmor, Janice R., and Shapiro, Bernice B. Experience and Environment: Major Influences on the Development of the Young Child, Vol. 1. Englewood Cliffs, New Jersey: Prentice Hall, 1973.

Articles and Reports

- Alberman, E. D. and Goldstein, H. "The At Risk Register . . . A Statistical Evaluation." British Journal of Preventative Social Medicine 24 (1970):129-135. Cited by John Meier, Screening and Assessment of Young Children at Developmental Risk. The President's Committee on Mental Retardation. Washington, D.C. DHEW Publication No. (OS) 73-90 (March 1973).
- Barsch, Ray H. "The Infant Curriculum . . . A Concept for Tomorrow." in Exceptional Children Vol. 1 The Normal Infant. Ed. Jerome Hellmuth. New York: Brunner/Mazel, 1967.
- Bayley, Nancy. "Comparisons of Mental and Motor Test Scores for Age One Through Fifteen Months by Birth Order, Race, Geographical Location and Education of Parents." Child Development 36 (1965):379-411.
- Bricker, Diane and Bricker, William. Toddler Research and Intervention Project: Report - Year I. IMRID Behavioral Science Monograph, Nos. 21 and 21. Nashville, Tennessee: Institute on Mental Retardation and Intellectual Development, George Peabody College for Teachers, 1971.
- . Toddler Reserach and Intervention Project: Report - Year II. IMRID Behavioral Science Monograph No. 21. Nashville, Tennessee: Institute on Mental Retardation and Intellectual Development, George Peabody College for Teachers, 1972.
- . Infant, Toddler and Preschool Research and Intervention Project: Report - Year III. IMRID Behavioral Science Monograph No. 23. Nashville, Tennessee: Institute on Mental Retardation and Intellectual Development, George Peabody College for Teachers, 1973.

- Bronfenbrenner, Urie. A Report on Longitudinal Evaluations of Preschool Programs, Vol. 2. Is Early Intervention Effective? DHEW Publication No. (OIID) 74-25, 1974.
- Caldwell, Bettye M. "Descriptive Evaluations of Child Development Settings." Pediatrics 40 (1967):46-54.
- _____. "The Effects of Psychosocial Deprivation on Human Development in Infancy." Merrill-Palmer Quarterly of Behavior and Development 16 (1970):379-411.
- _____. "The Rationale for Early Intervention." Exceptional Children 36 (1970):717-726.
- Casler, Lawrence. "The Effects of Extra Tactile Stimulation on a Group of Institutionalized Infants." Genetic Psychology Monographs 71 (1965):137-175.
- Escalona, Sibylle K. "Basic Modes of Social Interaction: Their Emergence and Patterning During the First Two Years of Life." Merrill-Palmer Quarterly of Behavior and Development 19 (1973):205-232.
- Forrester, Bettye J., Brooks, Geraldine P., Hardge, Beulah M., Outlaw, Doris D. Materials for Infant Development DARCEE. Nashville, Tennessee: John F. Kennedy Center for Research on Education and Human Development, George Peabody College for Teachers, 1970.
- Gilmer, Barbara, Miller, James O., and Gray, Susan. Intervention with Mothers and Young Children: A Study of Intrafamily Effects DARCEE Papers and Reports, Vol. 4 No. 11 Nashville, Tennessee: Demonstration and Research Center for Early Education, George Peabody College for Teachers, 1970.
- Gordon, Ira. The Florida Parent Education Early Intervention Projects: A Longitudinal Look. Institute for Development of Human Resources, Research Reports. Gainesville, Florida: College of Education, University of Florida, 1973.
- Gray, Susan W. and Klaus, Rupert A. The Early Training Project: A Seventh Year Report DARCEE. John F. Kennedy Center for Research on Education and Human Development, George Peabody College for Teachers, Nashville, Tennessee, 1969.
- Greenberg, Judi. "Analysis of Ch. 89, Laws of 1973 Relating to Special Education of Children with Exceptional Educational Needs." Informational Bulletin 73-77, Legislative Council Staff, State Capitol, Madison, Wisconsin (August 17, 1973).

Haynes, Una. "Comprehensive Services for Atypical Infants and Their Families." in Allied Health Approaches to Program Planning for Infants at Risk: Conference Proceedings. Ed. Marianne Lohan, Eileen Bughman and Ruth Heinemann. Chicago, Illinois: National Easter Seal Society for Crippled Children and Adults, 1974.

_____. "Overview of the National Collaborative Infant Project: A Nationally Organized Collaborative Project to Provide Comprehensive Services to Handicapped Infants and Their Families." in Allied Health Approaches to Program Planning for Infants at Risk: Conference Proceedings. Ed. Marianne Lohan, Eileen Bughman and Ruth Heinemann. Chicago, Illinois: National Easter Seal Society for Crippled Children and Adults, 1974.

Heber, Rick, Garber, Howard, Harrington, Susan, Hoffman, Caroline, and Falender, Carol. Rehabilitation of Families at Risk for Mental Retardation. Madison, Wisconsin: Rehabilitation Research and Training Center in Mental Retardation, University of Wisconsin, 1972.

Honig, Alice S. "The Family Development Research Program: With Emphasis on the Children's Center Curriculum." Paper presented at the Nisonger Center, Infant Curriculum Conference. Ohio: State University, June 1972. (Mimeographed).

_____, and Brill, Sheila. "A Comparative Analysis of the Piagetian Development of Twelve Month Old Disadvantaged Infants in an Enrichment Center with Others Not in Such a Center." Enlarged version of a paper presented at the annual meeting of the American Psychological Association, Miami, September 1970. (Mimeographed).

_____, and Caldwell, Bettye M., and Tannebaum, Jordan. "Patterns of Information Processing Used by and with Young Children in a Nursery School Setting." Child Development 41 (1970):1045-1065.

Kagan, Jerome. "Some Response Measures that Show Relations Between Social Class and the Course of Cognitive Development in Infancy." in Stimulation in Early Infancy. Ed. Anthony Ambrose. London: Academic Press, 1969.

Karnes, Merle, Teska, James A., Hodgins, Audrey S. and Badger, Earladeen D. "Educational Intervention at Home by Mothers of Disadvantaged Infants." Child Development 41 (1970):925-935.

LaCrosse, E. R., Lee, P. C., Littman, F., Ogilvie, D. M., Stodolsky, S. and White, B. L. "The First Six Years of Life: A Report on Current Research and Educational Practice." Genetic Psychology Monographs 82 (1970): 161-266.

- Lally, J. Ronald. "The Family Development Research Program: A Program for Prenatal, Infant, and Early Childhood Enrichment, Progress Report." College for Human Development. Syracuse, New York: Syracuse University, March 15, 1974. (Mimeographed).
- Lambie, Dolores Z., Bond, James T., and Weikart, David P. Infants, Mothers and Teachering: A Study of Infant Education and Home Visits. Summary of Final Reports. Ypsilanti Carnegie Infant Education Project. Ypsilanti, Michigan: High/Scope Educational Research Foundation, 1974.
- Levenstein, Phyllis. "Cognitive Growth in Preschoolers Through Verbal Interaction with Mothers." American Journal of Orthopsychiatry 40 (1970):426-432.
- _____, Kochman, A. and Roth, H. "From Laboratory to Real World: Service Delivery of the Mother-Child Home Program." American Journal of Orthopsychiatry 43 (1973):72-78.
- Lorenzo, Eliosa de. "The Effectiveness of Early Stimulation of High Risk Infants." in Brain and Intelligence, The Ecology of Child Development. Ed. F. Richardson Baltimore, Maryland: National Educational Press, 1973.
- Maurelli, John A. and Lally, J. Ronald. "The Effects of a Home Visitation Program on the Development of Disadvantaged Infants During the First Six Months of Life." Paper presented at the annual meeting of the Early Child Care Committee of the American Public Health Association. Atlantic City, New Jersey (November 12-16, 1972). (Mimeographed).
- Meier, John H. "A Survey of Infant Stimulation and Intervention Programs." in Parent Counseling and Infant Stimulation: Workshop Proceedings. Denver, Colorado, Mountain-Plains Regional Center for Services to Deaf-Blind Children (April 1972).
- Papousek, Hanus. "Experimental Studies of Appetitional Behavior in Human Newborns and Infants." in Early Behavior. Eds. H. W. Stevenson, E. H. Hess and H. L. Rheingold. New York: Wiley, 1967.
- Rheingold, Harriet, Gewirtz, Jacob L. and Ross, Helen W. "Social Conditioning of Vocalizations of the Infant." Journal of Comparative and Physiological Psychology 52 (1959):68-73.
- Rubenstein, Judith. "Maternal Attentiveness and Subsequent Exploratory Behavior." Child Development 38 (1967): 1089-1100.

- Sayegh, Yvonne and Dennis, Wayne. "The Effect of Supplementary Experiences Upon the Behavioral Development Of Infants in Institutions." Child Development 36 (1965):81-90.
- Scarr-Salapatek, Sandra and Williams, Margaret. "Effects of Early Stimulation on Low-Birth-Weight Infants." Child Development 44 (1973):94-101.
- Schaefer, Earl S. Progress Report: Intellectual Stimulation of Culturally-deprived Parents. National Institute of Mental Health. 1968. Cited by Bronfenbrenner. A Report on Longitudinal Evaluations of Preschool Programs Vol 2: Is Early Intervention Effective? DHEW Publication No. (OHD) 74-25, 1974.
- _____. "Need for Early and Continuing Education." in Education of the Infant and Young Child. Ed. Victor H. Denenberg. New York: Academic Press, 1970.
- _____, and Aaronson, M. "Infant Education Research Project: Implementation and Implications of the Home-Tutoring Program." in The Preschool in Action. Ed. R. K. Parker. Boston: Allyn and Bacon, 1972.
- Shearer, David, Billingsley, James, Frohman, Alma, Hilliard, Jean and Johnson, Frances, Shearer, Marsha. The Portage Guide to Early Education: Instructions and Checklist, Experimental Edition. CESA No. 12. Portage, Wisconsin: Cooperative Educational Service.
- Shearer, Marsha and Shearer, David. "The Portage Project: A Model for Early Childhood Education." Exceptional Children (Fall 1972):210-217.
- Sigel, Irving. "Developmental Theory: Its Place and Relevance in Early Intervention Programs." Young Children 27 (1972):364-372.
- Siqueland, Einar R. and Lipsitt, Lewis P. "Conditioned Head-Turning in Human Newborns." Journal of Experimental Child Psychology (1966):356-376.
- Skeels, H. M. and Dye, H. B. "A Study of the Effects of Differential Stimulation on Mentally Retarded Children." Pro Amer. Ass. Ment. Defic 44 (1939): 114-136. Cited by H. M. Skeels, Adult Status of Children with Contrasting Early Life Experiences. Monograph of the Society for Research in Child Development 31 (1966):1-65.

- Tannenbaum, Jordan A. "Home Stimulation Versus Developmental Scores for Children Attending the Children's Center." Syracuse, New York: Syracuse University 1969 (Mimeographed).
- Tjossem, Theodore D. "Rationale for Early Identification of High Risk Infants." in Allied Health Approaches to Program Planning for Infants at Risk: Conference Proceedings. Eds. Marianne Lohan, Eileen Bughman and Ruth Heinemann. Chicago, Ill.: National Easter Seal Society for Crippled Children and Adults, 1974.
- Todd, G. and Palmer, B. "Social Reinforcement of Infant Babbling." Child Development 39 (1968):591-596.
- Tulkin, Steven and Kagan, Jerome. "Mother Child Interaction in the First Year of Life." in The Competent Infant. Eds. L. Joseph Stone, Henrietta T. Smith and Lois B. Murphy. New York: Basic Books, 1973.
- Uzgiris, Ina and Hunt, Joseph Mc V. "An Instrument for Assessing Psychological Development." Psychological Development Laboratory, University of Illinois, 1966. (Mimeographed).
- Watson, John and Ramey, Craig. "Reactions to Response-Contingent Stimulation in Early Infancy. (In Press) Cited by John Meier. "A Survey of Infant Stimulation." in Parent Counseling and Infant Stimulation: Workshop Proceedings. Denver, Colorado, Mountain-Plains Regional Center for Services to Deaf-Blind Children (April 1972).
- White, Burton. "Informal Education During the First Months of Life." in Early Education: Current Theory, Research, and Action. Eds. Robert Hess and Roberta Bear. Chicago: Aldine Publishing Company, 1968.
- _____. The Role of Experience in the Behavioral Development of Human Infants: Current Status and Recommendations. Bethesda, Md.: ERIC Document Reproduction Service ED 48 917 1970.
- Yarrow, Leon J. "Dimensions of Early Stimulation and their Differential Effects on Infant Development." Merrill-Palmer Quarterly of Behavior and Development 18 (1972):205-218.