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THE PERFORMANCE OF DEPRIVED CHILDREN
ON THE BENDER GESTALT TEST

A DISSERTATION
SUBMITTED TO THE GRADUATE FACULTY
in partial fulfillment of the requirements for the
degree of
DOCTOR OF PHILOSOPHY

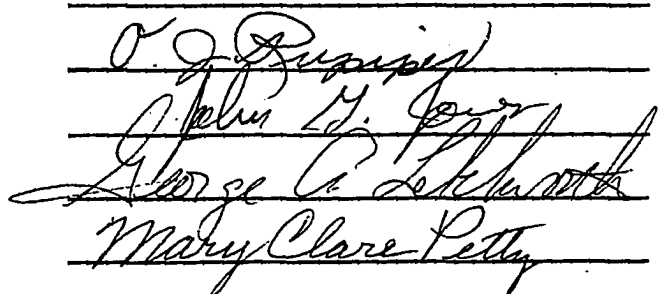
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1969

THE PERFORMANCE OF DEPRIVED CHILDREN
ON THE BENDER GESTALT TEST

APPROVED BY

The block contains four handwritten signatures, each written over a horizontal line. The signatures are: O. J. Durkin, John H. Jones, George C. Schwartz, and Mary Clare Petty. The handwriting is in cursive and somewhat stylized.

DISSERTATION COMMITTEE

ACKNOWLEDGEMENT

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THE PERFORMANCE OF DEPRIVED CHILDREN ON THE BENDER GESTALT TEST

CHAPTER I

INTRODUCTION

In the last four decades, a number of crises have occurred in this nation that have given rise to an "on-again-off again" type of concern over improving the quality and dignity of human resources in this country. After World War I information became available that revealed the existence of mental subnormality within the population that was far out of proportion to what it should have been (Ginzburg and Bray, 1953). Temporarily a few people became aroused over this condition. The problem was forgotten in the flurry of the prospering '20s. When the Great Depression arrived, with approximately 14 million standing idle unable to find jobs, the nation was forced to take a long hard look at its human resources. Concern again diffused into interest of other things. Following World War II and the Korean War again information was made available that made the nation aware that a problem of mental subnormality existed. Examination of this information revealed that larger numbers

of young men were classified as unfit for military service because of mental ineffectiveness (Ibid., 1953). This concern was disposed of as the nation prospered again. In the 1960's the Watts Riots occurred, and once again the country started to take a hard look at its human bank. The riots precipitated concern over poverty. The implication that poverty might have for mental development became one of the issues.

There has been speculation for a number of decades over the problem of mental subnormality. Contrary opinions have arisen as to why so many individuals in this nation were functioning below "normal". Certain researchers (Arlitt, 1922; Jensen, 1968) have stated that the problem of genetics can not be ignored; others (Hebb, 1949; Hunt, 1961; Neff, 1938) have taken the position that the environment was the major factor in the development of mental subnormality.

The Culture as Setting Limits

In 1921 Child's book, The Origin and Development of the Nervous System was published. This book appeared to be a forerunner in the trend toward relating environmental factors to development. Child made the suggestion that:

Development is a process of functional construction, that is, beginning with a given structure and function, the continuance of function modifies the structural substratum, and this in turn modifies further function.
 . . . (p. 114).

A few years later there were a number of studies supporting the hypothesis that the culture sets limits to

the mental functioning of an individual. These studies were by Neff (1938), Peterson and Lanier (1929), and Porteus (1930). Their results tended to support the hypothesis that the culture sets limits in test performance ability.

Nissen, Machover, and Kinder (1935) gave a battery of performance tests to fifty native African children whose ages ranged from approximately five to fourteen. These children were from an all native village and none of them had been exposed to formal education. These authors concluded that whatever factors shaped and directed cultural growth, inevitably these same factors shaped and influenced test performance. In addition these authors supported the concept that cultural sets may influence the individual functional level according to Child's dictum (Ibid., p. 14).

While one group of researchers had been concerned with the possible effects the culture could have on test performance another group was beginning to focus on the culture as setting limits to the kinds of employment a man might enjoy. In the late 30's, following the depression, research at Columbia University was directed toward understanding the basic role of human resources in the nation's economic structure. Ginzburg and Bray (1953) reported that several major publications emerged out of the Columbia studies: Grass on the Slag Heaps and The Story of Welsh Miners (1942), The Unemployed (1943), The Labor Leaders (1948), and Occupational Choice (1951). Information in

these publications implied that in certain isolated areas there was little interest on the part of the local communities in developing adequate educational facilities. This had implications for the future with the event of World War II.

In 1953 Ginzburg and Bray published a book which called attention to the nation's armed forces rejection rate for the period of World War II. During this period, over 5 million men, for one reason or another, were rejected as unfit for military service. A large portion of these men were classified as mentally incompetent. In analyzing their data, the authors concluded that many of the young men in question were victims of a type of retardation unique to the regions from which they had emerged.

With the implication that there was a type of cultural retardation, Sarason and Gladwin (1958), a psychologist and an anthropologist, respectively, became concerned with coming to grips over the classification of mental dysfunctioning:

From the standpoint of etiology, diagnostic clarity, prognosis, social implication, education orientation, and research planning, it can only be a source of confusion if mentally defective and mentally retarded individuals are not differentiated from each other (p. 18).

Because one type of mental dysfunctioning implied largely a remediation approach, and because another implied ameliorative action, in their report they focused on these definitions:

As a first step in this direction we have attempted to maintain in this report a distinction between mental deficiency, which presumes a contribution of organic disorder to subnormal functioning, and mental retardation, in which no pathology is necessarily detectible and environmental-primarily learning-deficits provide the casual explanations (p. 8).

These authors in delinating two types of mental subnormality suggested that there was a direct relationship between the environment and non-organic mental retardation. Sarason and Gladwin conceded that Ginzburg and Bray (1953) were correct in pointing out that if the rejection rates for World War II were examined carefully there was a definite regional patterning, and the screening that had been done was, in effect, an assessment of the individual's educational background.

A Learning Theory Needed

If the environment did set limits as indicated by some of the research of the period from 1921 to 1953, then there was the problem of explaining how learning occurred or why it did not occur under debilitating environmental conditions. While more and more probing had been going on with regard to the cause and effect relationship of mental retardation and the environment, Hebb (1949) had contributed a neuropsychological theory as to the cause and effect of human learning. The key concept in his theory was the cell assembly. This represented a closed system in which neural firing "reverberated" after receptor input had ceased. While

offering this theory, Hebb felt compelled to also offer a new theory of perception. The theory was that any "simple" perceptions were a product of learning and in addition they were additive.

Hebb cited research from the work of Senden (1932) and from Riesen (1947) that was fundamental to his argument. Senden's work had been with the blind, who had regained their sight following an operation. Data obtained from these individuals indicated that only a long arduous amount of learning had aided these individuals in developing perceptions that possessed identity. Riesen's research confirmed the work of Senden. His observations were made on chimpanzees reared in darkness. Riesen found that these primates were very slow to learn visual discrimination as compared to those reared under normal circumstances. From the findings of Senden and Riesen, Hebb concluded:

I proposed that the human capacity for recognizing pattern without eye movement is possible only as the result of an intensive and prolonged visual training that goes on from the moment of birth, during every moment that the eyes are open, with an increase in skill evident over a period of 12 to 16 years at least. The evidence supporting this proposition is found (1) in the errors made in tachistoscopic recognition, (2) in the way reading skill develops, and (3) in the rate and course of learning by the congenitally blind after operation (1949, p. 46).

In addition Hebb (1949, p. 119) further stated, "It is not just any learning that facilitates any other learning at maturity." This statement inferred early learning in childhood could be selective in its later effects.

Like Hebb, Bender (1938), in writing about tachistoscopic phenomena, appeared to have viewed perceptual development as a product of learning. For example, she discussed the fact that many primitive features appeared in those reproductions made when the individual was limited by time:

It is as though in each new act of perception, in a small but measurable unit of time, an individual re-experienced the whole maturation process of that sensory field and by so experiencing it integrates it into the pattern (p. 40).

She further remarked:

If one wants to become philosophical, one might conjecture that the capacity to integrate the temporal factor into immediately created perception requires a certain life span of experience (p. 51).

Bender joined with Schilder (1934) in breaking away from the classical Gestalt thinking of the period by postulating that children when viewing a complicated picture see parts and not the whole picture. And she stated that this appeared to contradict the established rules. Without really emphasizing the role of experience, she described the child moving from stage to stage in the development of visual motor reproductions, pointing out that time and experience entered into such reproductions. From this standpoint it would seem that Bender would agree with Hebb "that perception is additive, a serial reconstruction (though very rapid and unconscious for the normal adult)" (Hebb, 1949, p. 18).

As further evidence that Bender has gone beyond classical Gestaltism and as evidence that there was some

commonage of thought between her work and the work of Hebb the following is quoted:

But one must go further than Werthemier and Kohler and say, with Schilder and Sander, that the personal complexes, the training and the specific situation also help to determine the organization of each gestalt, and that the gestalt function or integration is not completed at the sensory level but is an active and progressive function of all parts of the nervous system, with a possible tendency, as will be shown in the course of this study, to localize in special fields in the cerebral cortex. Fundamentally, then, just as a gestalt arises from a state of flux in the sensory field, so it is always in a state of flux; it is never absolutely determined and is constantly subject to modifications depending on the nature of the stimuli, the reception in the sensory organ and sensory field, the state of the nervous system in the different levels through which it passes, the totality of the personality, including the emotional complexes, and the situation of context in which the reaction occurs. It is clear that the integrative functions undergo processes of maturation (p. 59-60).

In this statement Bender has broken away from the idea that the rules of gestalt are fixed and has taken the position that gestalts "depend in part on the biologic characteristics of the sensory field at the different maturation levels and the integrative integrity of the functioning nervous system" (p. 59). Hebb would appear to agree when he commented, "the fundamental difficulty with configuration theory, broadly speaking is that it leaves too little room for the factor of experience" (Hebb, 1949, p. 58).

Another fact that links the thought of Hebb and Bender was their mutual awareness of the research of Nissen, Machover, and Kinder (1935) cited earlier. With regard to this study Hebb has stated that he talked with Dr. Nissen:

In conversation, Dr. Nissen has made the point that the low scores were not due to slowness of movement, but to a slowness in identifying shapes--a slowness of perception (p. 119).

It will be recalled that these investigators had given performance tests to native African children. These children had not been previously exposed to the designs they were asked to draw. The results indicated that they did poorly as a group. On the other hand, Dr. Nissen pointed out that they could see things in the bush that he could not see.

While these children did rather poorly, Bender pointed out that even so, there were all levels of maturation within each age group. In order to understand what she meant by maturation the following is quoted:

My experiments, on the other hand, would lead to the conclusion that the child actually experiments with the different phenomena, getting satisfaction with each new experience which is complete enough for that stage of maturation of the developing organism growing from preceding experience level (1938, p. 18).

A New Concept of Intelligence

If the hypothesis that the environment could be limiting to the development of the intellect was accepted, that hypothesis would require a new concept of intelligence. The old concept of intelligence had been one of "fixed" intelligence. According to Hunt (1961, p. 352), Hebb's work emphasized the need for intellectual training to begin early, for it was based on the concept of intelligence as "a function of the variegation and mobility of the cell

assemblies established through primary learning within those regions of the brain not immediately concerned with receptor inputs or motor outputs." In addition Hunt said:

This conception suggested further that adult intelligence should vary with opportunities for perceptual and perhaps even motor experience in which a variety of inputs with appropriate degrees of redundancy are available (p. 352).

Hunt (1961) brought together past conceptions of intelligence and the roots thereof and the present concept that Hebb postulated. Hunt also succinctly demonstrated how Piaget, in outlining his approach to understanding the developing child's intelligence, complemented Hebb's theory. He felt that Hebb would agree with the following statement by Piaget:

The more new things an infant has seen and the more new things he has heard, the more new things he is interested in seeing and hearing; and the more variations in reality he has coped with, the greater is his capacity for coping (Hunt, 1961, p. 259).

Maternal Deprivation and Critical Periods

As the concept of intelligence as a variable to be manipulated gained ground other writers (Dennis and Najariah, 1957; Goldarb, 1943; Spitz, 1946; Scott, 1958; and Yarrow, 1961) became concerned with so called "critical periods" and maternal deprivation as factors in setting permanent limitations to the growth of the intellect. With relation to maternal deprivation and critical periods of development Yarrow has said:

The data from the research on institutionalization, maternal separation, and multiple mothering have relevance for a number of fundamental issues on developmental theory: questions concerning the kinds of environmental conditions which facilitate, inhibit or distort normal developmental progress; the conditions which influence the reversibility of effects of events in infancy and early childhood; and the extent to which the timing of an experience, i.e., the developmental stage at which it occurs, determines its specific impact (p. 464).

Yarrow (1961) discussed at length the studies on sensory deprivation in animals and the fact that these studies indicated that where an animal was completely restricted of perceptual experience early in life, there was permanent impairment in the functions involved in the deprivation. Other studies involving critical periods in the development of animals, such as those by Kuo (1939) and Scott (1958), pointed up that in certain animals there were critical periods in the learning process.

From animal research and from institutional research, a number of hypotheses emerged with regard to child development. These suggested there may be vulnerable periods in which intellectual damage could occur. The data were inconclusive at this point. Yarrow discussed the fact that even though the research was contradictory and the methodology questionable with regard to some of the studies of early childhood development, there was a "core of consistency" (p. 464). This core indicated:

The major characteristics associated with institutional care are: general intellectual retardation, retardation in language functions, and social and

"personality" disturbances, chiefly disturbances centering around the capacity to establish and maintain close personal relationships (p. 464).

In the area of motor functioning there were discrepant reports. Spitz (1946) reported marked retardation during the first and second years. Freud (1944) reported some of their nursery children were precocious in motor development.

A recent study by Pavenstedt (1967) suggested what might be nearer the truth, in discussing a group of children from deprived backgrounds who were involved in their research project. She commented:

Their motor coordination showed developmental anomalies. In some ways the children evidenced superior gross motor coordination for their ages. They were sure-footed, quick and capable of many advanced motor feats. They had an astonishingly good sense of rhythm. Motor activity was preferred and would produce an occasional expression of fleeting happiness on a child's face. But most of the time it appeared to be a vehicle for tension discharge. Wild motor activity or its opposite, a withdrawal to repetitive, mechanical movements, went hand in hand with an impaired capacity to control or to modulate impulsivity. They showed a lack of motoric caution which resulted in frequent falls and injuries. Thus we had 4-year-olds who would pump themselves on the swing like 8-year-olds, but fell off backwards like 2-year-olds (p. 57).

She went on to discuss the children's behavior, stating that these children appeared to avoid meeting a challenge by motor activities:

In summary, the children often used their bodies for diffuse discharge and avoidance, with little focus on the pleasures of attaining mastery (p. 58).

Deprivation and Perceptual Difficulties

There was little research with regard to delineating specific perceptual difficulties deprived children may have. What little data was available emerged out of the studies of Deutsch (1967) and his associates at the Institute for Developmental Studies.

One such study by Katz and Deutsch (1967) involved auditory and visual functioning and reading achievement. Several important findings emerged from this study. One finding was that poor readers had more difficulty in switching from one modality to another:

This result suggests that one variable which may underlie reading performance is the capacity to respond quickly to two sequential presented stimulus modalities (p. 259).

In addition their results indicated that children retarded in reading perform poorly on tasks demanding vigilance:

The low reading group made fewer correct responses and more incorrect responses, thus suggesting a deficiency in their capacity to sustain attention to a specific stimulus. This deficiency was especially pronounced on visually presented stimuli (p. 250).

One other pertinent point in their investigation was:

Investigation of developmental trends in the present study revealed that age differences paralleled the differences in reading achievement. This suggests that good readers may be operating on a higher developmental level, perceptually, than their retarded-reader counterparts (p. 252).

In general this study was noteworthy in adding support to the general notion that perceptual factors may play a causative role in those experiencing reading retardation.

Katz and Deutsch's conclusions would appear to verify what Hebb postulated--that deprivation robbed children of a key element in learning, that of the attention process. For in the Hebbian frame work, the control of attention was assumed to be achieved through the delivery of facilitation from one organizational structure to another. Since the sample involved in the Katz and Deutsch (1965) study involved low socio-economic Negro children, it might well be assumed that these children had had no previous "set" experience with which to perform appropriately in this task situation.

Past research indicated little documentation as to when perceptual deficits leveled off, in addition little information was available as to what effects later perceptive maturation might have on other types of development. The theorizing of Piaget has had pertinent implications; he had implied that each major step of intellectual development was the foundation for the next stage (1936). If Piaget had been correct in his assumptions then deficiencies in perceptual-motor abilities could be related to the deprived child's inability to move beyond the so called "concrete" level of thinking to an abstract level.

Summary

In summary, the authorities (Ginzburg and Bray, 1953; Hebb, 1949; Hunt, 1961; Riessman, 1962; and Sarason and Gladwin, 1958) have tried to demonstrate that there is a

relationship between intellectual development and environment. From the establishment of this relationship that the environment may stimulate or hamper the growth of individuals have emerged new concepts of intelligence as being learned and additive. These concepts of intelligence and perception in turn stimulated Hebb to propose a learning theory that went beyond Gestalt theory of learning or stimulus response theories.

Areas of intellectual functioning that deprived children seem to have deficits in were discussed. It was pointed out that generally the researcher (Deutsch, 1963; and Riessman, 1962) has been more concerned with language deficits and not other areas of functioning such as perceptual difficulties. Piaget's hypothesis that each major step of intellectual functioning was the foundation for the next stage was discussed as this would make it imperative that each step of development be examined as related to the development of the intellect. Perceptual development is one step in the hierarchy of intellectual development and as reported there is not a great deal of research with regard to deprived children and their perceptual development.

CHAPTER II

THE PROBLEM

From the research of the past two decades, there was increasing evidence that experience and richness in the environment were important factors in intellectual development. Evidence was presented for this position by Bender (1938), Carr (1925), Hebb (1949), Hunt (1961), Piaget (1936), and Yarrow (1961). This evidence made it untenable to accept either the assumption of predetermined "fixed" intellectual endowment or the assumption that the intellect would unfold through a maturational process. Hunt had made the following comment with regard to the emerging conception of intelligence.

A conception of intelligence as problem-solving capacity based on a hierarchical organization of symbolic representation and information-processing strategies deriving to a considerable degree from past experience, has been emerging from several sources. These sources include observations of human behavior in problem solving, the programming of electronic computers, and neuropsychology (1961, p. 109).

If these concepts had been accepted, then educators would have been directly involved in changes in curriculum for children who emerge from limited environments. There was little evidence that educational processes had been changed

to meet the needs of children from low-income groups other than in compensatory programs. Instead there appeared to be a movement to change the child and not the school environment. According to Wilkerson (1964), 82 per cent of the research about deprived children was addressed to the changes needed in the child. The remaining 18 per cent of the research concerned itself with changing the society or the school to meet the needs of the deprived child. The compensatory programs at the preschool level had given evidence that intervention education had raised the level of performance of deprived children (Gray and Klaus, 1965; Kirk, 1958; and Weikart, Kamii and Radin, 1964). The success of such intervention programs seemed to indicate that the environmental component was a major factor in determining the relationship between the child's actual level of achievement and that level of which he was potentially capable. Ideally, ameliorative activities should have been initiated as early as possible; however there were already in the system many children, who should have had remedial consideration, but who for various reasons were not privileged to participate in compensatory programs. Perhaps, there was no adjustment within the elementary educational system because there was no applied research to demonstrate some of the deficits that these children suffered at each grade level.

The comment was made in Chapter I that very little was available in the research literature with regard to the

perceptual development of deprived children. Since there was such a paucity of data available, a number of questions arose which appeared to be significant. These included: (1) When does visual motor development become mature in deprived children? and (2) Are there any racial differences in the deprived child's visual motor development?

In view of these questions, this study was designed to investigate whether there were differences in the visual motor development of deprived and non-deprived children, and whether race would be a factor contributing to any differences. In addition, if it could be established that deprived children did mature later, as Deutsch (1963) has suggested, then normative data could be established demonstrating when maturity occurred.

The following hypotheses were formulated:

Hypothesis 1: There is no statistically significant difference in the mean scores between the respective groups of deprived and non-deprived children performing on a visual motor test.

Hypothesis 2: There is no statistically significant difference in the mean scores between the respective groups of Negro and white deprived children performing on a visual motor test.

Hypothesis 3: There is no statistically significant difference in the mean scores between the respective groups of children from schools with a deprivation ratio of less

than 50 per cent and those with greater than 50 per cent performing on a visual motor test.

Hypothesis 4: There is no statistically significant difference in the mean scores between the respective groups of children from schools with a deprivation ratio of 50 per cent and those from schools with a deprivation ratio of 75 per cent performing on a visual motor test.

Hypothesis 5: There is no statistically significant difference in the mean scores between the respective groups of children of this sample who are deprived and those of the Koppitz normative sample performing on a visual motor test.

Hypothesis 6: There is no statistically significant difference in the mean scores between the respective groups of children of this sample who are non-deprived and those of the Koppitz normative sample performing on a visual motor test.

CHAPTER III

LITERATURE ON THE BENDER GESTALT

VISUAL MOTOR TEST

The Bender Gestalt Test of Visual Motor Maturity was developed by Lauretta Bender and published in 1938. Bender recognized that the young child does not experience perception as the adult does. However, she was certain by the time a child could read and write, he must have visual motor experiences similar to the adult. For this reason she became interested in seeing how "gestalten" arose in a child's development and the role maturation played in the developing process. Out of this interest in the child's visual-motor maturation, the Bender Gestalt Test emerged. The format has remained unchanged.

The Bender Gestalt Test, hereafter referred to as Bender, consisted of nine cards, each $3\frac{3}{4}$ by 5 and on each card there is a geometric design. These designs became increasingly more difficult from card A through card eight, for the subject to reproduce, depending on the subject's age. The subject was asked to copy or draw these designs on a plain white unlined paper $8\frac{1}{2}$ " by 11". There was no

time limit. The directions according to Bender were simply, "Here are some figures for you to copy; Just copy them the way you see them" (1946).

Included in the instructions was a summary for evaluating the responses at each year of age. The purpose of the summary was to evaluate "maturational norms and levels of retardation and regression" (1964, p. 5).

Selection of the Bender

The Bender was chosen for this study because the author, Lauretta Bender, presented in detail the process of maturation of visual-motor perception in young children from age three to eleven years. In addition the test was simple to administer and the work of Koppitz (1946) provided an objective scoring technique which yielded quantitative results. The Koppitz normative data were provided in the same age range as those under consideration in this study. Finally it was selected because the results from numerous studies (Allen, 1968, Fabian, 1945, Keogh and Smith, 1967, Koppitz, 1958, and Pascall and Suttell, 1951) indicated the test had validity and reliability in predicting achievement in reading, spelling, and mathematics.

Review of the Bender Literature

Much of the research using the Bender was related to adults and not to children. Although Bender originally stated that her test was a maturational developmental test and that

it had no value after the age of eleven, it was amazing that so much work had been done with adults and so little with children. A review of the research in which the Bender was used revealed that there were varied methods, techniques, procedures, and selected samples which illustrated the use of the test as a diagnostic tool. These studies included: performance of individuals classified as organic; comparisons of achievement scores and Bender protocols; reading ability and Bender reproductions; intelligence scores; rotation phenomena and the maturational factor.

Organicity. - When a person was suspected of neurological impairment, according to Tolar and Schulberg (1963, p. 106), the Bender was used more frequently to assist in making a diagnosis than any other test. Studies that indicated the Bender had contributed to successful diagnosis of organicity were those of Baroff (1957), Beck (1959), Bensberg (1952), Bensberg and Feldman (1953), Bowland and Deabler (1956), Haplin (1955), Hanvick (1953), and Shaprio, Field, and Post (1957). From the research by these individuals it appeared that the Bender could assist in differentiating between endogenous and exogenous mental defectives. Studies by Hirschenfang (1960) and Riklan and Diller (1961) indicated that Bender performance was closely related to the intactness of the non-dominant hemisphere. For example, hemiplegics with a lesion on the non-dominant hemisphere did significantly poorer on the Bender, as scored by the Pascal and

Suttell Scoring Method (1951), than the right hemiplegic patients. Studies by Shaw and Cruickshank (1956) and Wewetzer (1956) indicated that the Bender was a good tool for assisting in the diagnosis of neurological impairment.

Achievement. - Koppitz (1958) found a statistically significant relationship between I.Q. and school achievement, but an even closer relationship between the Bender and achievement. She reported:

For the first two grades visual motor perception and I.Q. are both significantly related to school achievement and may overlap to a considerable degree. With one exception all the good students had good Benders with few deviations (the one exception was a Bender of average quality), and all had an I.Q. of above 100 with the exception of two Ss whose I.Q.'s were in the high 90's. All the poor students had poor Benders and low I.Q.'s with the exception of two very immature, slow moving, non-verbal children. Two bright Ss with severe visual motor difficulties were also among the poor students (p. 294).

However, at the third and fourth grade level the relationship of I.Q. and school achievement was less related than at the first and second grade:

On the third and fourth grade level there was found to be a somewhat greater discrepancy between school achievement and I.Q., than among the younger Ss. All good students were found to have good Benders--even the three Ss whose I.Q.'s were below 100. Among the poor students with below average I.Q., 10 had poor Benders, while three had fairly adequate Benders but revealed severe emotional problems in addition to difficulties in auditory perception. Speech problems, poor auditory perception and extremely low frustration tolerance were present in the four children who did poorly in school despite above average I.Q.'s. Two of these had quite adequate Benders (p. 294).

In another study by Koppitz (1958) an attempt was made to determine whether use of the Bender would enable the

researcher to differentiate achievement levels of children above and below average in the areas of reading, writing, and spelling. The results indicated that the Bender could differentiate between above-average and below-average students in the first four grades of school.

Keogh and Smith (1967) in a longitudinal study that began at the kindergarten level, found that the Bender could predict the level of educational achievement in the upper school grades. Benders administered at the kindergarten level correlated highly but inverse with sixth grade reading (-.51), and spelling (-.31). This meant a child having a low Bender score in the first grade could be expected to read at grade level six or better when he reached the sixth grade. They found, however, that they could not make such predictions testing children at the third grade level.

Intelligence. - Studies by Pascal and Suttell (1951), Peixotto (1954), and Sullivan and Welsh (1947) indicated that there was little relationship between intelligence scores and Bender function when the child was without impairment. For other subgroups of children, such as those referred to child guidance clinics, or classified as maladapted or retarded, Tolar and Schulberg (1963, p. 166) stated, "it would appear that the greater degree of impairment, the higher is the correlation between Bender performance and intelligence."

Rotation. - Fabian (1945), Griffith and Taylor (1960), Hanvik (1953), and Jernigan (1967) concerned themselves with

the rotation phenomenon, which was the phenomenon of rotating a figure when reproducing that figure, or copying it, by 45° or more. Fabian found the rotation factor was common in the performance of preschool children. He also said that by the time a child was between seven and one-half and nine years of age, there should be no rotations (only seven per cent did so). Fabian concluded that children are prone up to the age of seven to "verticalize" horizontally directed figures. Hanvik maintained that when rotations occurred, they were almost always pathognomic of brain damage. Ko (1961), in contrast, felt that rotations may not be a good indicator of brain pathology in the lower age ranges, i.e., up to seven years of age.

Standardization Research

Scoring Systems

A number of scoring systems have been devised using the Bender; Billingslea (1948), Gobetz (1953), Hutt and Briskin (1960), Koppitz (1958), and Pascal and Suttell (1951) have contributed in this area. The Koppitz system, however, was the only one designed specifically for children.

Tolar and Schulberg (1963) have stated that objective scoring systems do not enhance the Bender's validity. At the same time they pointed out (p. 204) that too little was known about learning disabilities as reflected in Bender test performance. Using an objective scoring system would appear

to be the only way of determining the kinds of errors that deprived children make.

Maturation Research

Although the test was conceived as a test of maturation, except for Bender (1938) and Koppitz (1958) little research had been directed toward demonstrating this quality of the test. Allen (1968) addressed himself to the "question of the role of level of visual perceptual maturation in the reproduction of the B-G test model designs" (p. 131). He divided a group of children into high and low perceivers and found that high perceivers reproduced the Bender figures more like the test designs than did the low perceivers. Culbertson and Gunn (1966) also reported findings which indicated the level of perceptual maturation was an important variable when an individual was asked to reproduce visual stimuli.

Cultural Studies

Although the Bender was not given in the experimentation of Nissen, Machover, and Kinder (1934), the fifty native children were asked to reproduce figures of geometric design. The authors reported:

Tendencies to rotation in the Designs Test, like the reversal tendencies in the Cube Imitation Test, suggest the general problem of spatial orientation and merit investigation as to whether such phenomena appear as prominently among Negro children of comparable age with American upbringing (p. 329).

In a study by Joseph and Murray (1951), it was found that many of the kinds of reproductions of native Saipanese appeared, according to Bender, in confusional states of native born Americans. Sarason and Gladwin (1958) commented that the "diagnostic norms of the test were vitiated by the different perceptual modes of the Saipanese." They discussed the differences in cultures with relation to viewing pictures, i.e., and pointed out that this was a three-dimensional culture where as the Saipan environment was one of two dimensions only (Sarason and Gladwin, 1958, p. 137).

Werner, Simonian, and Smith (1967) reported they found many children with reading problems in a study of Hawaiian, Filipino, and Portuguese children (in Hawaii) who spoke "pidgin" English. They found their subjects had adequate Benders. These authors, however, did not report errors by age groups; therefore, it can not be determined whether there was a late maturing factor in the visual motor abilities of their sample.

Koppitz (1959) found "the mean Bender scores show a marked difference between the classrooms of varying socioeconomic status. Thus the "mean Bender score of class A is about six months below the mean score of the total group" (p. 165).

Normative Studies

The normative studies of children were those by Armstrong and Hauch (1960), Koppitz (1958, 1964), Pascall and

Suttell (1951), and Suttell (1951). Pascal and Suttell reported: "there seems to be little doubt, on a qualitative basis, of the maturational factor involved in reproducing the designs" (p. 23). These authors also pointed out that there was little relation between Bender scores and the I.Q. (p. 22), but their sample had an I.Q. range of 101 to 132; therefore, none of the children could be classified as having an intellectual impairment. In prior studies it was demonstrated that there was little relationship between intelligence scores and the Bender function unless the child was impaired in his functioning. Koppitz (1964, p. 433) found that sex was not a distinguishing factor, therefore she combined all scores of boys and girls in the normative data she presented. Koppitz demonstrated with her normative data that as age goes up, developmental scores go down (a low score indicated a good Bender).

The Integrative Factor

Koppitz (1964) has stated that visual-motor perception was a "complicated integrative function which involved both visual perception and the motoric expression of the perception" (p. 96). She pointed out that many youngsters reproduced the Bender figures as best they could and would point out the obvious discrepancies between their reproductions and those they were asked to duplicate. Then, knowing these differences existed, they were still unable to do better. Another group produced distortions and were not

able to detect those distortions when their reproductions were compared to the Bender designs side by side. In older children it was easier to identify the problem whether it was motoric or perceptual, because as Koppitz stated, one was not dealing primarily with the problem of maturation. Bender (1938) and Murray and Roberts (1956), in examining patients who were victims of temporary diseases of the brain, found each one progressed through various stages of maturation in moving from lower to higher levels of integrative functioning on the Bender. Beery (1967) has made the tentative hypothesis "that form copy may be a relatively sensitive measure of lack of neurological integrity, whether this is disorganization resulting from damage, or failure of organization resulting from inadequate experience" (p. 24).

Validity of the Bender

Koppitz (1958) used the Bender to investigate whether it was a useful tool for diagnosing learning disturbances. Her subjects consisted of two groups of children in grades one through four. Group one was composed of 77 subjects, 41 were selected because they were above average in adjustment and achievement, 36 had below average achievement. In her second group there were 51 clinic patients, 20 referred because of a lack of school progress, 31 because of emotional problems. She used her objective scoring system to derive a developmental score for each child. Mean composite scores were derived for grades 1 and 2, 3 and 4 and all grades.

Koppitz then used "chi-squares" to compare the good and poor students whose Bender Composite Scores were above and below the Group mean. Composite Score; the good students tended to have a low Composite Score; the poor students had high Composite Scores. A cross-validation was carried out using the second group of children. The Mean Composite Scores were higher for Group II than for Group I. The results indicated that the Bender was a good diagnostic tool for differentiating between children with and without learning problems (1958, p. 293).

Reliability of the Bender

Koppitz (1964) reported that Miller, Loewenfeld, Lindner and Turner in 1962 made a reliability study of the Koppitz objective scoring system. Each investigator scored independently, 30 Bender protocols from young clinic patients. Pearson product-moment correlations were computed between the test scores of all raters. All correlations were statistically significant and ranged from .88 to .96. This report demonstrated one type of reliability, that of scorer agreement. Another type of reliability, that of consistency of test scores was accomplished through the test-retest procedure. The problems involved were: (1) To test too soon after the initial testing might involve practice effect; (2) To wait too long would involve the maturational aspect. Therefore, Koppitz retested four months after the initial administration, in order to avoid committing these

errors. For the reliability study she used two kindergarten classes and two first grade classes. Kendall's Rank Correlation Coefficient was utilized to derive the reliability coefficient between first and second administrations of the test . . . "All correlations were found to be statistically significant at the .001 level" (Koppitz, 1964, p. 14).

CHAPTER IV

METHODS AND PROCEDURES

Design of the Study

The Bender Gestalt Test of Visual Motor Maturity was individually administered in the Spring of 1966 to 1,140 third- and fourth-grade students from twelve different schools representing six geographic areas in the state of Arkansas. The schools were classified as deprived or non-deprived as elaborated below.

Operational Definition of Deprivation

The State Department of Education routinely reports to the Federal government the percentage of children who are deprived in each school in the state. A deprived child is one who comes from a home where the annual family income is less than \$3,000 or the individual income is less than \$1,500. Each school superintendent computes the rate of deprivation for his school. For example, a 34 per cent deprivation rate means that in a school with an enrollment of 500 children, 170 are deprived. Deprivation rates are presented in Table 1 for each school included in this sample. A school was classified as non-deprived if the deprivation rate was less than

TABLE 1
DEPRIVATION PERCENTAGE FOR EACH
SCHOOL POPULATION OF SAMPLE

School Number	Per Cent of Deprived Students
1	53.5
2	74.0
3	74.0
4	34.3
5	29.0
6	43.0
7	8.0
8	26.0
9	35.0
10	50.0
11	----*
12	26.0

Source: State Department of Education

*Private School

10 per cent and if it was located in an area in which either the median family income was above \$3,000 per annum, or the individual median income was above \$1,500. The median and individual family incomes in the counties where the schools are located are presented in Table 2.

The Koppitz Scoring System

The Koppitz (1964) scoring system is an objective technique for evaluating the development of visual motor ability in children. Koppitz presents normative data for ages 8 years through 10 years, 11 months in her manual of directions. The Koppitz system evaluates each Bender reproduction in terms of errors of distortion, integration, perserveration, and rotation. The more errors the child makes, the lower his visual motor developmental age.

According to Koppitz' instructions (1964, p. 15) all errors are scored as one (present) or zero (absent). She suggested that scoring be liberal because the system was designed for "young children with as yet immature fine motor control" (p. 15).

The Pilot Study

A pilot study was performed using all third-grade students from a single school located in a deprived area. By the operational definition set forth on page 31, this school had a 34 per cent deprivation rate. The median family income was \$2,175. The Bender was individually administered

TABLE 2
INDIVIDUAL AND MEDIAN INCOME DESCRIPTIONS
FOR AREAS IN WHICH SCHOOLS OF
SAMPLE ARE LOCATED

School Number	Individual Income	Median Family Income	Per Cent of Families with Income Under \$3,000
1	1,547	2,614	56.5
2	1,922	1,902	66.6
3	1,922	1,902	66.6
4	2,885	2,175	47.7
5	2,437	3,511	24.5
6	1,599	2,255	62.3
7	2,437	3,511	24.5
8	2,888	4,935	14.8
9	1,658	2,497	58.9
10	1,823	2,633	56.2
11	2,437	3,511	24.5
12	2,317	3,683	23.5

Source: U.S. Department of Health, Education and Welfare, Welfare Research Report, September, 1964; Family Income and Related Characteristics Among Low-Income Counties and States.

by the author to each of the 80 children in this group. Each Bender was scored a week after testing and again six months later in order to determine scorer reliability ($r=.91$). As a further check of reliability, another psychologist scored 25 of these Bender protocols. The interrater correlation was .89.

Each child was assigned to an appropriate age group, the same as that used by Koppitz in her study. The Koppitz scoring system was used to derive a Bender developmental score for each child, and means and standard deviations were computed for each age group. The mean performance of each age group in this deprived pilot sample was compared with the mean performance of the corresponding age group in the Koppitz sample by means of a t test. The results are shown in Table 3. The deprived group was less mature in visual-motor development at all age levels, with differences at the .01 level of significance.

The results from the pilot study seem promising enough to warrant enlarging the study to include a geographical representation of the entire state to determine if the results would prevail in all areas. In addition, since all the subjects of this pilot sample were Negro, the questions of whether white deprived children would perform differently remained unanswered.

TABLE 3

PILOT STUDY COMPARISON-KOPPITZ NORMATIVE GROUP

Age	N	Koppitz Study Mean	S.D.	N	Pilot Study Mean	S.D.	<u>t</u>
8-6 - 8-11	60	2.50	3.03	26	5.00	2.09	4.4*
9-0 - 9-5	65	1.70	1.76	28	4.97	2.80	7.2*
9-6 - 9-11	49	1.60	1.69	10	4.20	.30	6.3*
10-0 - 10-5	27	1.60	1.67	6	4.10	1.40	3.7*

*Significant at the .01 level

Administration of Tests

Shortly after the pilot study was conducted, persons from one of the child guidance clinics in the state undertook administration of a battery of tests throughout the state to establish baseline information for future educational planning. All testing for this clinic was performed by nonprofessional persons trained by a qualified psychological staff. The tests were administered during regular school hours in the child's own school environment. The Bender was included in this battery, and the students' test reproductions were made available to the author.

The Sample

Fifty five schools representing six geographical areas participated in the state-wide project. Two schools were randomly selected from each area to be included in this study. An exception was made in order to insure inclusion of the school in which the pilot study was made.

The state in which this study was conducted had a median family income of \$3,184, with 47.7 per cent of the families having yearly incomes under \$3,000. The population was 57.2 per cent rural and 42.8 per cent urban. The non-white population was 21.9 per cent of the total. The percentage of non-white and of rural residents in the counties in which each of the 12 selected schools was located is presented in Table 4.

TABLE 4
DEMOGRAPHIC BREAKDOWN OF THE SAMPLE

School Number	Per Cent Non-White	Per Cent Rural	Per Cent Urban	Child Per Capita Expenditure
1	33.9	71.0	29.0	290.83
2	41.2	100.0	----	260.64
3	41.2	100.0	----	260.64
4	21.5	17.0	83.0	270.00
5	10.2	38.0	62.0	335.00
6	.9	79.5	20.5	351.00
7	10.7	38.0	62.0	335.00
8	21.5	17.0	83.0	407.00
9	1.5	70.7	29.3	293.00
10	----	86.9	13.1	325.00
11	10.7	38.0	62.0	Private*
12	1.0	45.0	55.0	363.22

Source: Arkansas State Department of Education;
Arkansas State Department of Welfare, 1967.

*Reported by Individual School

The rural schools in this investigation were located in communities with median family incomes ranging from \$1,902 to \$2,633. The urban schools were in communities with median family incomes ranging from \$3,300 to \$3,565 (Source: Bureau of the Census, U.S. Department of Commerce). The characteristics of the school populations and the communities in which the schools were located follow:

School #1 was located in the southeastern section of the state. The total population of the county was 15,213, 71.0 per cent rural. Some 56.5 per cent of the families residing in this county had incomes of less than \$3,000, the median family income was \$2,614. The non-white population of the county was 33.9 per cent, however the school population was 100 per cent Negro.

School #2 was located in the northeastern section of the state in a county that had 18,990 people. The community was classified as 100 per cent rural. Sixty-six per cent of the families had less than \$3,000 per year income; the median family income was \$1,902. The per cent of non-white in this community was 41.2; the school itself had 100 per cent white population.

School #3 was located in the northern section of the state in a county with slightly less than 19,000 people, and was classified as 100 per cent rural. The median family income for the county was \$1,902; 66.6 per cent of the families had less than \$3,000 per year income. The community was

41.2 per cent Negro; the school population was 100 per cent Negro.

School #4 was located in the heart of the state, on the outskirts of a large metropolitan area. The median income for the families in this section was \$2,175. The community is predominately Negro, and the school is composed of 100 per cent Negro population.

School #5 was located in the southwestern section of the state. The community in which the school was located had 47,000 population. No median family income figures were available, however the average income per person was \$2,437, whereas the state average per person was \$2,029 (Source: Arkansas Business Bulletin, Bureau of Business and Economic Research, University of Arkansas, November, 1967).

School #6 was located in the northwestern part of the state in a county with a population of 17,267. The immediate community in which the school was located had only 447 persons. The median family income for the families in this region was \$2,255, and 62.3 per cent of these families had less than \$3,000 per year. In this community 79.5 per cent of the population lived in rural areas. Less than one per cent of the population were non-white.

School #7 was located in the same community as school number 5. 100 per cent of the school population was white.

School #8 was an integrated school located in the center of the state in an urban community of over 100,000

population. The school population was 79 per cent Negro, whereas the community population was 22.9 per cent Negro. The median family income for this area was approximately \$4,635.

School #9 was located in the northeastern section of the state. The county population was 12,520, 70.7 per cent being rural. The school population was all white whereas the community population was 1.4 Negro. The median family income was \$2,497, with 58.9 per cent of all families earning less than \$3,000 per year.

School #10 was located in the far northeastern part of the state. The total county population was 21,258, and 86.9 per cent lived in rural areas. The school population was 100 per cent white; the community was 100 per cent white. The median family income for the county was \$2,633, and 56.2 per cent of the families had income less than \$3,000.

School #11 was a private school located in the southwestern part of the state. The school was composed of all white students. The community itself had 11 per cent Negro population. The median family income for this community was \$3,511.

School #12 was located in the far northwestern corner of the state. The school population was all white; the community was all white. The per person income for the county in which this school was located was \$2,317 against the state average of \$2,029.

The percentage of rural and urban population for the communities in which the 12 schools were located is presented in Table 4.

Treatment of the Data

The groups of students were divided into the following categories for comparison:

- (1) Deprived and non-deprived
- (2) White deprived and Negro deprived
- (3) Above 50 per cent deprived, below 50 per cent deprived
- (4) 50 per cent deprived only, 75 per cent deprived
- (5) Deprived and the total Koppitz normative group
- (6) Non-deprived and the Koppitz normative group

Each of these divisions was further divided into appropriate age groups, as outlined previously in the pilot study on page 37. Then means and standard deviations were calculated for each age group in each category. The complete results may be found in the appendix. In addition, other subdivisions of the data not treated statistically are presented graphically. Some of the results depicted in these graphs suggest areas for future research. Differences between the mean scores of the sample groups were evaluated by t tests.

CHAPTER V

RESULTS

The purpose of this study was to determine whether on a visual motor test: (1) there would be mean differences in the performance of non-deprived and deprived children; (2) there would be mean differences in group performance as a function of the number of deprived children in a group; (3) there would be mean differences in performance between Negro and white children when both groups were from schools with the same deprivation ratio. The six hypotheses presented in Chapter II were tested and the results were as follows:

Hypothesis 1: There is no statistically significant difference in the mean scores of deprived and non-deprived children performing on a visual motor test.

The entire sample of students was divided into two groups. Group I contained all students from non-deprived schools and Group II contained all students from deprived schools. The students were then assigned to appropriate age groups. A Koppitz developmental score was calculated for each child with respective means and standard deviations

derived for each age group. The results are shown in Table 5. In testing the difference of mean scores a two tailed t test resulted in statistically significant differences at each age level except one, 10-6 to 10-11. The null hypothesis was therefore rejected for all age levels up to 10 year 5 months. The results were all in favor of the non-deprived groups at all age levels although the difference at the 10-6 to 10-11 age level was not statistically significant.

Hypothesis 2: There is no statistically significant difference in the mean scores of Negro and white deprived children performing on a visual motor test.

All deprived students included in the sample were identified as white or Negro and then assigned to appropriate age groups. The means and standard deviations of the Koppitz developmental scores were calculated for each age and race group. The t test revealed significant differences at all age levels. The results are presented in Table 6. The null hypothesis was rejected for all age levels. The results suggest that the deprived Negro student performs less well on a test of visual motor coordination than the deprived white child.

Hypothesis 3: There is no statistically significant difference in the mean scores on a visual motor test of children from schools with a deprivation ratio of less than 50 per cent and those from schools with a deprivation ratio greater than 50 per cent.

The deprived group was divided into two groups. The first group contained students from schools with greater than 50 per cent deprivation ratio and the second group contained students from schools with less than 50 per cent deprivation ratio. Each student was assigned to an appropriate age group, and the means and standard deviations of the Koppitz developmental scores were determined for each age and deprivation group. A t test of the difference of mean scores yielded significant results ($t=.005$) at age levels 8-0 to 8-5, 10-0 to 10-5, and 10-6 to 10-11, therefore for these age groups, the null hypothesis was rejected. In the age groups 8-6 to 8-11, 9-0 to 9-5, and 9-6 to 9-11 the differences in the mean scores were not significant, therefore the null hypothesis was accepted. The results indicated that as the number of children who are deprived increases in a school, at age levels 8-0 to 8-5, 10-0 to 10-5, and 10-6 to 10-11, there occurs a rise in the mean developmental scores. A high development score infers less mature visual motor ability. This did not occur at age levels 8-6 to 8-11, 9-1 to 9-5, and 9-6 to 9-11. Further investigation of the data revealed there was unequal Negro and Caucasian representation. This data is presented in Table 8. Further analysis of this data suggest the factor of race was responsible for there being no difference at age levels 8-0 to 8-6, 9-0 to 9-5, and 9-6 to 9-11. The results are presented in Table 8.

Hypothesis 4: There is no statistically significant difference in the mean scores of children from schools with a deprivation ratio of 50 per cent and those from schools with 75 per cent deprivation.

Just those schools with 75 per cent and 50 per cent deprivation were used in this part of the study. All students in the respective deprived groups were assigned to an appropriate age group. The mean and standard deviation Koppitz developmental scores were derived for each respective age group, and for the difference of mean scores was evaluated by a t test. The results indicated there was no significant difference in the Koppitz developmental mean scores at any age level. Therefore, the null hypothesis was accepted. In comparing schools with 50 per cent and 75 per cent of deprivation levels the research data suggest that once a school has been satiated with more than a 50 per cent deprivation ratio there are no longer any differences when groups are compared. The results are presented in Table 9.

Hypothesis 5: There is no statistically significant difference in mean Koppitz developmental scores of the deprived children in this sample and those of the Koppitz normative sample.

All deprived children of this sample were assigned to an appropriate age group. The mean and standard deviation of Koppitz scores was determined for each age group. The mean score of each group was compared to the Koppitz

normative group mean score at each appropriate age level by means of a t test. This analysis yielded significant results ($P=.005$) at all age levels except 8-0 to 8-5, therefore, except for that age level, the null hypothesis was rejected. The results suggest that deprivation operates as a factor to lower the level of visual motor functioning. The results are presented in Table 10.

Hypothesis 6: There is no statistically significant difference in the mean Koppitz developmental scores of the non-deprived children of this sample and those of the Koppitz normative sample.

The non-deprived children of this sample, who attended schools 7 and 11, were assigned to appropriate age groups, and means and standard deviations of the Koppitz scores were completed for each age group. The mean score of each group was compared to the Koppitz normative group mean score at each appropriate age level by means of a t test. The results were not significantly different at any age level. Thus, the non-deprived groups of this sample appear to be similar in visual motor maturity to the Koppitz normative group. The results are presented in Table 11.

TABLE 5

COMPARISON OF DEPRIVED AND NON-DEPRIVED SAMPLE GROUP AT EACH AGE LEVEL

Age		N	Mean	Median	S.D.	S.E.	Range	t
8/0 -	Non-deprived	22	2.90	2.66	2.60	.56	5	2.66*
8/5	Deprived	38	4.58	4.50	2.21	.35	11	
8/6 -	Non-deprived	39	2.64	2.35	1.46	.23	6	3.21*
8/11	Deprived	151	3.80	4.18	2.13	.17	10	
9/0 -	Non-deprived	64	2.00	2.00	1.93	.24	5	5.92*
9/5	Deprived	229	3.84	3.68	2.27	.14	13	
9/6 -	Non-deprived	33	2.20	2.12	1.40	.24	5	3.07*
9/11	Deprived	213	3.53	3.12	2.43	.16	13	
10/0 -	Non-deprived	37	2.32	2.41	1.19	.20	4	2.66*
10/5	Deprived	155	3.43	2.94	2.47	.19	11	
10/6 -	Non-deprived	9	3.00	3.00	2.00	.56	5	1.63
10/11	Deprived	65	3.91	3.64	2.60	.32	10	

*P= < .01

TABLE 6
COMPARISON OF KOPPITZ DEVELOPMENTAL SCORES OF DEPRIVED
NEGRO AND WHITE CHILDREN

Age		N	Mean	Median	Mode	S.D.	S.E. Mean	Range	t
8/0 -	Negro Deprived	13	6.00	6.00	5-7	2.63	.78	11	3.19*
8/5	White Deprived	12	3.34	3.50	2-3-4	1.24	.35	6	
8/6 -	Negro Deprived	29	4.60	4.68	5	2.29	.28	10	3.15*
8/11	White Deprived	69	3.55	2.87	3	1.03	.19	7	
9/0 -	Negro Deprived	62	4.65	4.16	3	2.67	.30	13	4.69*
9/5	White Deprived	78	2.93	2.73	2	1.64	.20	10	
9/6 -	Negro Deprived	99	4.57	4.15	4-5-6	2.30	.24	13	4.98*
9/11	White Deprived	88	3.02	2.87	2	1.92	.19	10	
10/0 -	Negro Deprived	45	4.73	4.95	6	2.24	.33	12	3.91*
10/5	White Deprived	18	2.55	2.62	3	1.16	.55	5	
10/6 -	Negro Deprived	6	5.20	5.80	5-7	1.35	.27	9	4.58*
10/11	White Deprived	25	1.83	1.83	2	1.67	.68	4	

*P= < .01

TABLE 7

A COMPARISON OF STUDENTS KOPPITZ DEVELOPMENT SCORES FROM SCHOOLS WITH
MORE THAN AND LESS THAN 50 PER CENT DEPRIVATION RATIO

Age	Deprivation Ratio	N	Mean	Median	Mode	S.D.	S.E. Mean	Range	t
8/0 - 8/5	Above 50% Below 50%	15 23	5.46 4.00	5.00 3.90	5 4-5	2.64 1.61	.68 .33	11 7	2.12**
8/6 - 8/11	Above 50% Below 50%	66 85	3.84 4.00	3.00 4.22	3 3	2.18 2.59	.26 .28	9 10	.40
9/0 - 9/5	Above 50% Below 50%	114 115	4.12 3.99	3.64 3.39	4 6	2.19 2.30	.20 .21	11 13	.44
9/6 - 9/11	Above 50% Below 50%	114 99	3.00 3.33	3.41 2.83	3 2-3	2.79 2.08	.25 .21	13 13	.97
10/0 - 10/5	Above 50% Below 50%	73 82	3.97 3.05	3.60 2.60	2 2	2.32 2.30	.26 .25	10 11	2.48**
10/6 - 10/11	Above 50% Below 50%	34 31	5.35 2.30	5.21 2.05	5-7 2	2.33 1.85	.39 .33	10 8	5.81*

*P= < .01

**P= < .05

TABLE 8
 NEGRO AND WHITE REPRESENTATIONS AMONG SAMPLE
 SCHOOLS WITH MORE THAN AND LESS
 THAN 50% DEPRIVATION

Age Groups	More Than 50% Deprived Ratio	Less Than 50% Deprived Ratio
8/0, 10/0, 10/6		
Negro	61%	45%
White	39%	55%
8/6, 9/0, 9/6		
Negro	51%	56%
White	49%	44%

TABLE 9

COMPARISON OF KOPPITZ DEVELOPMENT SCORE OF CHILDREN FROM SCHOOLS
WITH 50 PER CENT AND 75 PER CENT DEPRIVATION

Age		N	Mean	Median	Mode	S.D.	S.E. Mean	Range	t
8/6 -	50% Deprivation	40	3.88	3.40	3	2.08	.31	9	.69
8/11	75% Deprivation	26	4.26	3.00	3	2.36	.36	9	
9/ -	50% Deprivation	78	3.53	3.40	3	2.20	.25	11	1.73
9/5	75% Deprivation	36	4.28	4.25	5	2.07	.33	9	
9/6 -	50% Deprivation	69	3.65	3.25	3	2.36	.26	10	1.31
9/11	75% Deprivation	45	4.30	3.75	2-8	2.93	.43	13	
10/0 -	50% Deprivation	53	4.41	3.35	2	2.09	.28	9	.32
10/5	75% Deprivation	20	4.60	4.75	1-5	2.74	.61	10	
10/6 -	50% Deprivation	20	5.05	5.21	5-7	2.35	.39	10	1.00
10/11	75% Deprivation	14	5.85	5.50	5	2.24	.59	10	

TABLE 10

A COMPARISON OF THE KOPPITZ NORMATIVE DATA GROUP MEANS
AND THE DEPRIVED GROUP OF THIS SAMPLE MEANS--TEST OF
SIGNIFICANCE RESULTS

Age Group	Koppitz			Deprived Group			t
	N	Mean	S.D.	N	Mean	S.D.	
8/0 - 8/5	62	3.70	3.60	38	4.58	2.21	1.36
8/6 - 8/11	60	2.50	3.03	151	3.80	2.13	3.53*
9/0 - 9/5	65	1.70	1.76	229	3.84	2.27	7.05*
9/6 - 9/11	49	1.60	1.69	213	3.53	2.43	5.28*
10/0 - 10/5	27	1.60	1.67	155	3.43	2.47	3.70*
10/6 - 10/11	31	1.50	2.10	65	3.91	2.60	4.51*

*P < .01

TABLE 11
COMPARISON OF NON-DEPRIVED STATE SAMPLE
WITH KOPPITZ NORMATIVE SAMPLE

		N	Mean	S.D.	t
8/0 -	Koppitz	62	3.70	3.60	.95*
8/5	Non-deprived	22	2.90	2.60	
8/6 -	Koppitz	60	2.50	3.03	.27*
8/11	Non-deprived	39	2.64	1.46	
9/0 -	Koppitz	65	1.70	1.76	.92*
9/5	Non-deprived	64	2.00	1.93	
9/6 -	Koppitz	49	1.60	1.69	1.67*
9/11	Non-deprived	33	2.21	1.52	
10/0 -	Koppitz	27	1.60	1.67	1.99*
10/5	Non-deprived	37	2.32	1.23	
10/6 -	Koppitz	31	1.50	2.10	1.92*
10/11	Non-deprived	9	3.00	1.93	

*Not Significant

CHAPTER VI

DISCUSSION

The visual motor maturation level of 884 deprived and 204 non-deprived children, age 8 years to 10 years 11 months, was determined by using the Bender Gestalt Test and applying the Koppitz scoring system. Significant differences in the level of visual motor maturation existed when mean developmental scores of deprived and non-deprived children were compared at ages 8 years to 10 years five months. The final deprived and non-deprived age group (10-6 to 10-11) did not differ significantly; however, the trend was in the direction of significance ($p = < .20$). The sample of non-deprived children in this age group was nine. Possible enlargement of the sample could lead to more conclusive results.

All deprived children age groups, i.e. 8-0 to 10-11, were further divided into white and Negro sub-groups. Analysis of the data revealed that Koppitz mean developmental scores were significantly different at all age levels ($p = < .01$). Mean developmental scores of white deprived children of each age group indicated they were functioning

approximately one year behind at all age levels when compared to the equivalent Koppitz normative sample age group. The deprived Negro children of this sample were functioning approximately four years behind when compared to the normative data of the Koppitz study. If it may be assumed that being four years behind in visual motor ability has any effect on the level of functioning in other academic subjects, this study suggests that for Negro children special curriculum work designed to improve the level of visual motor functioning should begin prior to eight years of age.

In comparing the performance of children from schools with greater than and less than 50% deprivation, analysis of the data revealed there were significant differences in the mean developmental performance for age groups eight years to eight years 5 months, 10-0 to 10-5, and 10-6 to 10-11. Analysis of the data, did not yield significant differences in mean performance for age groups 8-6 to 8-11, 9-0 to 9-5 and 9-6 to 9-11. It was initially expected that as deprivation increased there would be a rise in the mean developmental scores of all age groups, not just the three mentioned. However, this did not occur. Further investigation of the data revealed there was another factor operating which could have affected the mean scores of the three age groups that were not significantly different. A breakdown of the groupings 8-6 to 8-11, 9-0 to 9-5, 9-6 to 9-11, into white and Negro subgroups revealed that in these age

groupings, the Negro and white representation was nearly equal (5% variation) in both the above and less than 50% deprivation ratio groups of children. This was not the case for age groups 8-0 to 8-5, 10-0 to 10-5, and 10-6 to 10-11. In these age groups the Negro population was 16 per cent greater than the white population in the greater than 50 per cent deprivation ratio group. In contrast the white population was 16 per cent larger in the less than 50 per cent deprivation ratio group.

Earlier it was demonstrated that deprived Negro children, when compared to deprived white children, had higher developmental mean scores (less mature visual motor ability). This increased Negro representation in the below 50% ratio grouping and the counter increase of white children in the above 50% ratio grouping would decrease the effect of the deprivation variable and increase the effect of the race variable. This finding is consistent with results presented in Table 6. Possible equalization of the racial representation could have led to different results.

Comparison of mean developmental scores of children from schools with 50% and 75% deprivation ratio yielded no significant differences. A re-examination of the data, however, could yield results again related to race.

When Koppitz normative data was compared at each age level to the deprived and non-deprived children of this sample, the Koppitz mean developmental scores of the deprived

children were significantly different ($p=.01$) at all age levels except in the 8-0 to 8-5 age grouping. It was mentioned earlier that children do not usually show maturity of visual motor functioning at this age. The mean developmental score of the non-deprived children of this sample did not differ significantly from the Koppitz normative sample.

Examination of the mean developmental scores for both the Koppitz normative sample and the non-deprived sample of this study revealed that the Koppitz developmental mean scores dropped steadily from 3.7 at age 8 years to 1.5 at age 10 years 11 months. The non-deprived mean developmental scores of this sample dropped from 2.9 at age 8 years to 2.0 at age 9 years 5 months and then began to rise again from age 9 years 6 months to 10 years 11 months. The Koppitz sample contained a cross cultural representation from urban, semi-urban and rural areas. No specific information was available to determine what per cent of the normative sample would fall into the deprivation category. As stated earlier, the non-deprived group of this sample had a ten per cent deprivation ratio. Increased numbers of affluent children in the age groupings 9-6 to 10-11 could have lowered the mean developmental scores, thereby making the sample groupings more equal in their visual motor performance.

Implications for Further Study

Information from the normative data of the Bender and Koppitz studies indicated that children are able to copy all

nine designs successfully by the age of eleven years. The results of this study suggest that deprived Negro and Caucasian children, respectively, have a one to four year developmental deficit in visual motor ability. This suggests that normative data should be obtained that would provide knowledge as to when these children do mature in visual motor tasks as measured by the Bender Gestalt Test. Such information should be useful in making curriculum changes that would assist in eliminating visual motor deficits that deprived children experience. In addition such information would have implications for psychologists working with deprived children in diagnostic situations.

CHAPTER VII

SUMMARY AND CONCLUSIONS

The visual motor maturation level of 884 deprived and 204 non-deprived children, age 8 years to 10 years 11 months, were determined by using the Bender Gestalt Test and applying the Koppitz scoring system. Significant differences in the level of visual motor maturation were found to exist between mean developmental scores of respective deprived and non-deprived children at ages 8 years to 10 years five months. All deprived children age groups, 8-0 to 10-11, were further divided into white and Negro sub-groups. Analysis of the data revealed Koppitz mean developmental scores were significantly different at all age levels ($p < .01$). Mean developmental scores of white deprived children of each age group indicated they were functioning approximately one year behind at all age levels when compared to the equivalent Koppitz normative sample. The deprived Negro children of this sample were functioning approximately four years behind the normative group of the Koppitz study.

When the performance of children from schools with greater than and less than 50 per cent deprivation ratio

were compared, there were significant differences in the mean developmental scores for three age groups, 8-0 to 8-5, 10-0 to 10-5, and 10-6 to 10-11. The data did not yield significant results at age levels 8-6 to 8-11, 9-0 to 9-5, and 9-6 to 9-11. Re-examination of the data revealed an unequal representation of Negro and white children in the above and below 50 per cent ratio groupings. Possible equalization of this factor could have led to different results. Comparison of Koppitz mean developmental scores of children from schools with 50 per cent and 75 per cent deprivation ratio did not yield significant differences. Re-examination of this data could yield results related to race.

When Koppitz normative mean developmental scores were compared at each age level to the deprived and non-deprived mean developmental scores of this sample, the Koppitz mean developmental scores were significantly different ($p < .01$) from the deprived developmental mean scores at all age levels except in the 8-0 to 8-5 groupings. The mean developmental scores of the non-deprived children of this sample did not differ significantly from the mean developmental scores of the Koppitz normative sample group. This suggests the two samples are similar.

Informative from the normative data of the Bender and Koppitz studies indicated that children are able to copy all nine designs successfully by the age of eleven years. The results of this study suggest that deprived Negro and

Caucasian children, respectively, have a one to four year developmental deficit in visual motor ability. This suggests that normative data should be obtained that would provide knowledge as to when these children do mature in visual motor tasks as measured by the Bender Gestalt Test. Such information should be useful in making curriculum changes that would assist in eliminating visual motor deficits that deprived children experience. In addition such information could be utilized by psychologists working with deprived children in diagnostic situations.

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APPENDIX

APPENDIX I

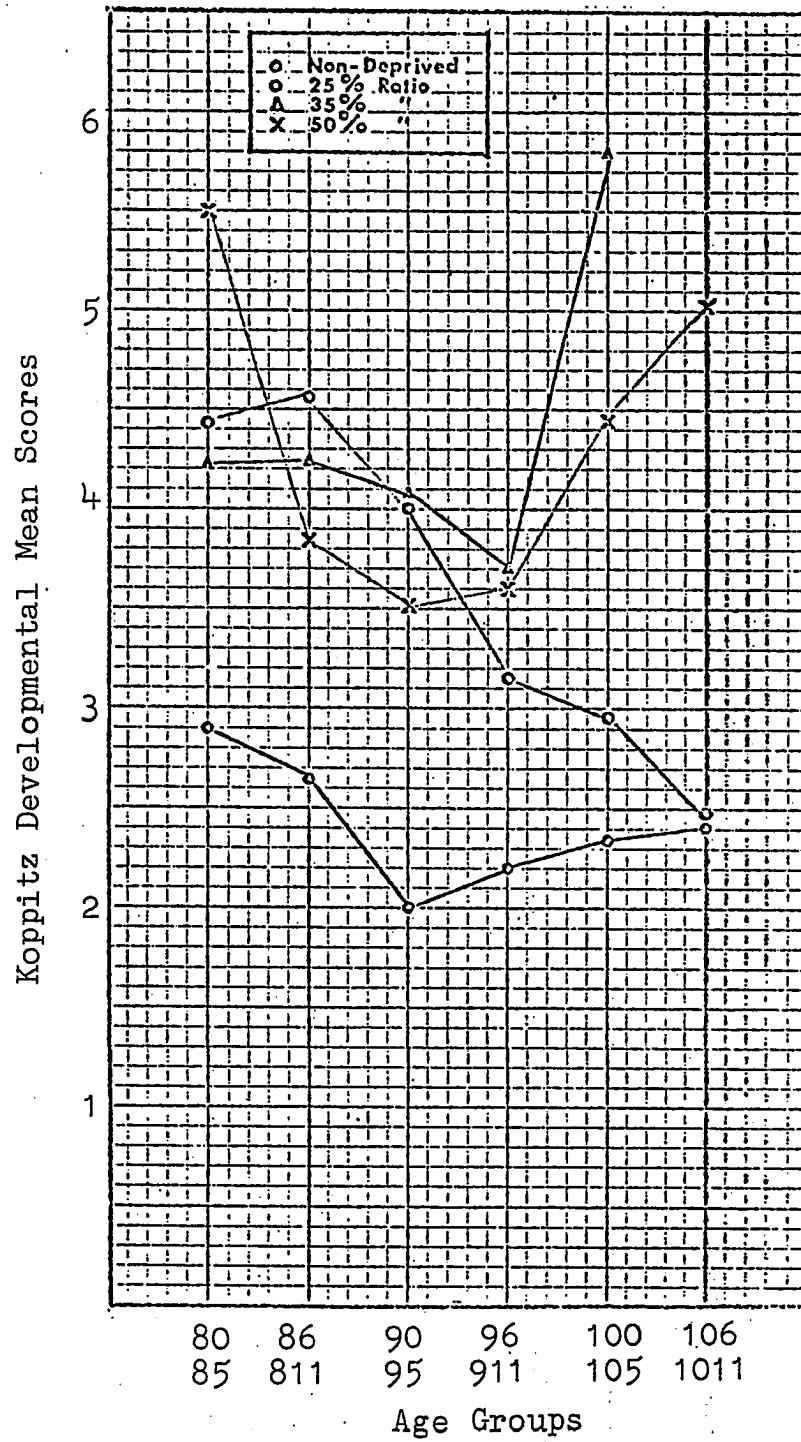


Fig. 1. Performance curves for four deprivation ratio levels.

APPENDIX II

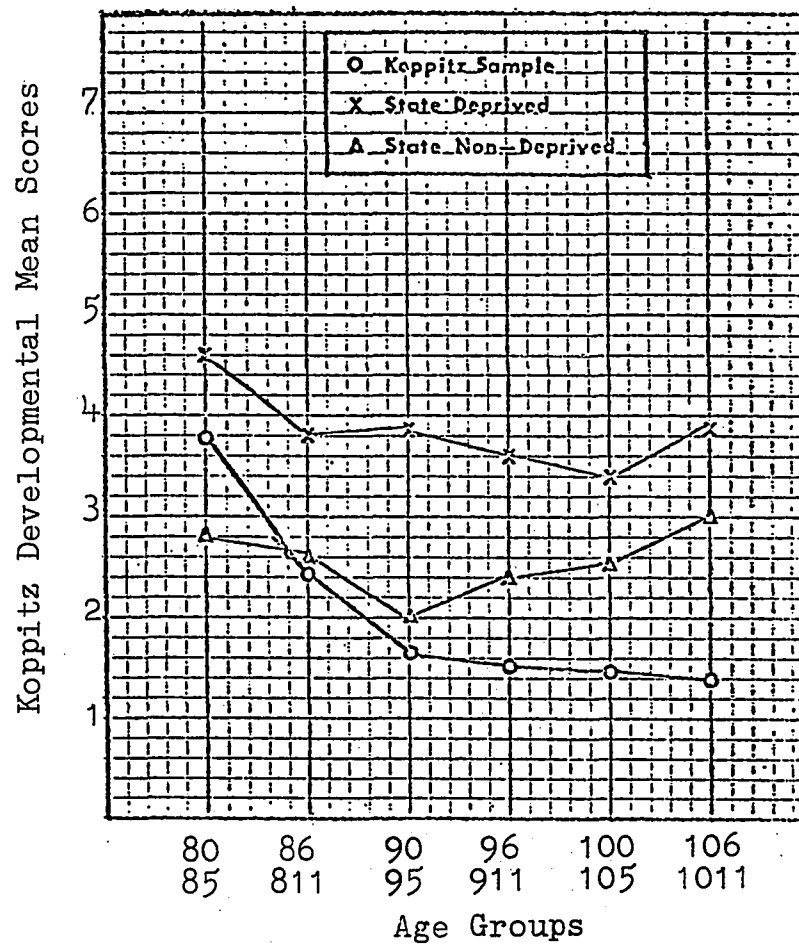


Fig. 2. Performance curves for Koppitz sample and State Deprived and Non-Deprived.