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ABSTRACT

This cross-cultural study investigated methods of using drawing to develop the cognitive abilities of disadvantaged preschool children. Five teaching methods were compared in parallel programs in Tel-Aviv, Israel and Columbus, Ohio. The Traditional Method, in which materials are supplied but are not used to emphasize cognitive development was used in the control group. The four experimental groups employed the (1) Discussion Method, (2) Observation Method, (3) Touch Method, and (4) Technical Training Method to amplify what the children know of the subjects they draw, and what they can do in the drawings. The sample consisted of a total of 215 prekindergarten and 228 kindergarten children in both countries. Instruments to assess artistic development and cognitive performance were developed. Results indicate that experimental teaching methods produced significant gains while the control method did not. Methods of observation and drawing technique were most effective, and the results were generally similar for both national groups. It is concluded that (1) drawing is an effective medium for developing cognitive abilities when carefully designed methods are employed, and (2) disadvantaged children from the two countries have similar needs and potentialities. (DP)

Final Report

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AN EXPERIMENT IN THE USE OF DRAWING TO PROMOTE COGNITIVE DEVELOPMENT IN DISADVANTAGED PRESCHOOL CHILDREN IN ISRAEL AND THE UNITED STATES

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AUTHOR'S ABSTRACT

Purposes: to develop the cognitive abilities of preschool disadvantaged children by the use of drawing as the primary teaching medium; to compare the effectiveness of five methods, one traditional and four new, all taught by the children's regular teachers; to run parallel programs in Tel-Aviv, Israel, and Columbus, Ohio to test similarity of responses of disadvantaged children. Methodology: experimental treatments were designed for teacher intervention, each with its particular emphasis: (1) discussion, (2) observation, (3) touch, (4) drawing technique; pre-post testing, using a battery of 10 newly devised tests for measurements of cognitive development, artistic development, and verbal development. Results: the traditional method did not produce appreciable gains; experimental methods did; best gains were in cognitive and artistic abilities in drawing, using methods of observation and drawing technique; responses were generally similar in the two national groups. Conclusions: drawing is an effective medium for cognitive and affective development of preschool disadvantaged children, presuming methods designed for specific forms of intervention; disadvantaged preschool children in the two national groups have similar needs and potentialities, implying benefits to be derived from international collaboration in developing effective education for disadvantaged populations.

PREFACE

This project is the result of several years of development, rooted primarily in Israel where the effective education for disadvantaged children has been a paramount concern for two decades. Recognizing that a primary need of preschool disadvantaged children is cognitive learning, experimentation had been fostered in the use of new teaching methods toward this end. When the opportunity arose to work with inner-city children in the United States, the conclusion was reached that the needs of disadvantaged American children were like those of disadvantaged Israeli children, and that cross-national collaboration might be productive for both countries. In consequence, the Tel-Aviv University and the Tel-Aviv public schools became collaborators with The Ohio State University and the Columbus, Ohio public schools in a joint venture, represented by this project.

Acknowledgments are due scores of university and public school participants in both countries. To name each of these persons is not feasible, though not to name each is not to recognize that the whole depended on the commitment of each; the project was fully and necessarily collaborative throughout; the caring runs deep in those who are willing to experiment to find better ways of helping disadvantaged children.

Hosts to the project in America were two agencies, one within the public schools for field operations, and one within the university for research operations. The support of these agencies, without thought of extrinsic reward, was crucial to the creation and conduct of the project. In the Columbus Public Schools, Frank Maraffa, Director of Instructional Services through the Department of Special Program Development opened the way to full involvement in the schools. In The Ohio State University, Samuel C. Kelley, Director, and the staff of the Center for Human Resource Research, offered housing and supplemental support for the project's research activity. We are grateful to those who serve beyond the call of duty; without that margin, it seems clear that no margin of human development is possible.

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PART ONE - INTRODUCTION

CHAPTER I
THE ORIGIN OF THE PROJECT

The Setting Giving Rise to the Project

National recognition of the need for effective education of disadvantaged children came in the United States in the 1960's. National recognition of a similar need had come in Israel in the 1950's. There, over half the children were coming from disadvantaged homes. For national survival, the success of these children in school was critical since their failure could mean failure of the modernizing economy and political democracy on which national life depended. Acutely aware of the stakes involved, experimentation in education to find effective ways of teaching the disadvantaged was launched a decade ahead of similar trials in the United States.

Among those educators involved in Israel with experimentation in preschool education was Dr. Sara Smilansky of Tel-Aviv University who had received her graduate education in the United States at The Ohio State University. Through continuing linkages of contact and exchange of personnel, similar needs were recognized in the problems faced in Israel and the United States. Appointed as Visiting Professor at The Ohio State University for periods during 1969-1973, Dr. Smilansky undertook not only her work in the University but also work with the staff of the Columbus Public Schools particularly involved with "Title I" schools and the education of preschool disadvantaged children. Having already designed and partially completed a program for experimentation in the use of drawing as means of teaching a similar population in the preschools in Israel, Dr. Smilansky was invited to design and conduct a similar program in Columbus.

The opportunity was thereby afforded for the project herein reported. By conducting the program in Columbus and completing the program in Israel, the data were obtained for international comparisons and the testing of the rationale and methods employed.

Needs Giving Rise to the Project Design

The experiment came to form out of the recognition of certain needs. Experience both in Israel and the United States has taught that, apart from effective preschool education, large proportions of

disadvantaged children experience failure in the early elementary years, after which their failure in school accelerates. The losses to the children and society are high.

Preschool education of disadvantaged children, therefore, needs to include, as a major aim, the development of those abilities essential to later success in school. One set of these essential abilities is "cognitive." These are abilities associated with "knowing" and "knowing one knows," achieved by the child at a level where he can gain pleasure from the display and pursuit of his knowing. Preschool education for disadvantaged children needs to include programs systematically designed to achieve "cognitive development."

Historically, preschool education has generally served affective needs rather than cognitive needs. In consequence, the objective of cognitive development calls for relatively new and different teaching methods--especially so when that aim is seen as unobtainable apart from a correlative development in the affective domain. The methods needed cannot simply be added methods for an added objective but methods which freshly reconstruct the old to include the objective of the old with the new in a more developed integration.

Searching for that level of integration, one is confronted with the need to supply to preschool children a ready way by which they can express and display what they know so that they can enjoy their involvement in coming to know more. As yet too young to use the skills of reading and writing toward this end, they need the functional equivalent. Such can be supplied by making available to them the means by which "reading" and "writing" were functionally carried on before the writing and reading of words had historically begun, i.e., by the use of pictures. A preschool child, unable to form the word "house" on paper can, nonetheless, form its meaning-equivalent in picture form. He and others, can "read" it, getting meaning therefrom. Preschool children can, thereby, functionally "read" and "write," communicating their knowings to one another and significant adults. By resorting to drawing, they can gain means to cognitive development while also enjoying what expression in an art form allows in affective satisfactions and development. Through teaching programs specifically designed to use drawing as means to cognitive development, preschool disadvantaged children can gain in cognitive capacities, so essential to their eventual success in school, while also benefitting from satisfactions and growth in the affective domain.

Tradition, however, mitigates against the use of drawing in this way. Drawing, as an art form, is assumed to be useful in preschools for affective development but not for cognitive development. Indeed, the use of drawing or any art for cognitive ends, is generally thought to be disruptive of, rather than contributory to, affective ends.

If drawing is to be used in preschools for teaching at a level integrative of cognitive and affective development, it is therefore

necessary to create explicit ways of doing so, to experiment with those ways, and to test their possibilities. Otherwise, little progress can be expected in the use of drawing in preschools for the disadvantaged; hence the central thrust of this project.

With the central thrust postulated, we had then to consider the context in which the experiment would be carried out. Having derived the central idea from consideration of what might benefit the children, we approached the context question from consideration of what might benefit the teachers. Teachers have needs as well as children, and it is patently clear that except as experimentation serves the teachers, it will have no way to reach the children. The obvious answer, in this case, is to so design the experiment that teachers of preschool disadvantaged children are themselves the ones who conduct the experimental teaching.

Traditionally, experimental teaching is usually done in specially designed situations isolated from the actual context in which the mass of practitioners operate. The results are then "isolated" and difficult, if not impossible to "diffuse" or "apply." By designing the experiment so that the results are created in the circumstances in which they apply, one should have results valid for application, and recognizable as such not only by the teachers participating in the experiment but by their cohorts, similarly placed in other preschools enrolling disadvantaged children; hence the design of the experiment to include classroom teachers as major participants.

With the central engagement and the immediate context thus clarified, we had, concurrently, to confront the fact that though Israel and America are far apart in many ways, they seem nonetheless to have common problems when they each undertake to generate effective education for disadvantaged children. It is a salutory experience to attend a staff meeting in a back street school in Jerusalem where so many sights and sounds are different, and then, when a translation of the discussion is later made available, to discover that what had been said, apart from the proper names, could have fit to a staff meeting in a back street school in Columbus, Ohio. The similarities open wide the question: What is the circumstance that binds together such seeming difference? Is it "modernization"?

A review of the recent history of a number of modernizing states makes clear that the advantage-disadvantage gap is, indeed, a widespread phenomenon. The need for effective education of disadvantaged children is an accompaniment of the modernizing trend. Solution for any given state may well depend on its penetrating deep enough to find the underlying ground on which child development depends in <u>any</u> modernizing land--in which case, collaboration across national and cultural boundary lines affords an advantageous way to work. The cultural differences that appear then become a leverage by which to differentiate the deeper base on which the development of children can

more soundly rest, being closer to the way a child is made to grow by virtue of his being human specimen beneath his culture dress; hence the plan to run parallel experiments in Israel and the United States.

Thus, from certain needs, an overall design was born for an experiment, the motivating needs when summarized, being the following (i.e., the need for):

1) Effective education of disadvantaged preschool children.

2) Cognitive development in these children.

3) New teaching methods that integrate cognitive development with affective development.

4) Experimental teaching that can use an art-based medium (in this case, drawing) as a prospective instrument for cognitive-affective development.

5) An experiment in which the teachers of preschool disadvantaged children do the diagnosis and the experimental teaching.

6) Data which can indicate the degree to which and ways in which disadvantaged preschool children in two widely separated modernizing nations are, in fact, alike (or different).

7) Data which can indicate the relative effect of common methods used to teach in the two environments, and, within each environment, the relative effect of each method in generating cognitive-affective development.

8) Transnational ways to collaborate in educational development.

Preview of the Diagnostic Study and Experimental Teaching Plan

With the foregoing needs in mind, what came to form in time, was a plan for experimental teaching as follows:

1) Parallel diagnostic plans for the two environments, Israeli and American.

2) Parallel teaching plans for the two environments, Israeli and American.

3) Treatment groups of about 50 children each, half prekindergarten and half kindergarten.

4) Five treatments all using drawing: one traditional, not emphasizing cognitive development, and four new, all emphasizing

cognitive development: (a) using discussion in conjunction with drawing; (b) using observation of models in conjunction with discussion and drawing; (c) using touch of models in conjunction with observation, discussion and drawing; (d) using direct training in drawing skills in conjunction with observation, discussion and drawing.

5) Duration of treatments: 10 weeks, three teaching sessions per week, one-half hour each session.

6) Testing: IQ and two invented sets, one in the medium of drawing and one in the medium of words referring to similar content.

7) Scoring of drawings for cognitive content and artistic quality, and scoring of word reports for cognitive content.

8) Data analysis: comparing results by national groups, grade level, and treatment groups to produce: (a) evidence as to the comparability of the "disadvantaged" in the two countries; (b) evidence as to the effectiveness of the new teaching methods for cognitive (as well as affective) development; (c) evidence as to the relationship between cognitive development as expressed in drawing and cognitive development as expressed in words; and (d) evidence as to the relationship between cognitive development and artistic development in drawings.

While coming to the plan, another need emerged, i.e., to clarify the basic concepts on which the plan would operate. For example, we needed to specify the operational meaning of (a) disadvantage as related to modernization and schooling, (b) cognitive development as related to disadvantaged preschool children, (c) drawing as a medium for cognitive development, and (d) experimentation as "applied." These are the concerns of the subsequent chapter.

CHAPTER II
THEORY: UNDERLYING ASSUMPTIONS AND RATIONALE

We are here concerned with matters of assumption, rationale and theory having an effect on the structuring of the experiment. In Section A, we give attention to three assumptions commonly made about preschool education which, in our experience, misguide preschool teaching when it involves disadvantaged children; we state alternative assumptions and then engage in a more extended explication of our relevant theories.

In Section B, we confront "the problem of application" and present a rationale toward solution by a design for experimentation which includes the intended users as the primary products; i.e., in this case, a design which calls for field-based teachers of preschool disadvantaged children to be the persons who themselves do the experimental teaching.

In Section C, we present a rationale for each of the teaching methods to be employed, relating each method to conceptions of cognitive development as potentially instrumented through varied uses of drawing as the primary medium.

In brief statements, we then summarize conceptual dimensions of the experiment by restating the needs giving rise to the experiment, the purposes guiding it, the assumptions underlying it, and the theories introduced.

A. Common Misleading Assumptions and Their Alternatives

Three common assumptions cited; alternatives stated: This project got its conceptual impetus from experience which had taught that certain assumptions commonly made about preschool education were preventing the development of programs which could successfully meet the needs of preschool disadvantaged children. These assumptions concern (1) the presumed locus of "disadvantage," (2) the place of cognitive development in preschool education, and (3) the role of drawing in child development.

With respect to the locus of "disadvantage," it is commonly assumed that the dominant factor to take into account in teaching disadvantaged children is the culture of their origin. In reference to Israel and the United States, it is assumed that what fits to the disadvantaged children in Israel is markedly different from what fits to the disadvantaged children of the United States. This is because of marked

differences in the cultural origins of the two disadvantaged populations, the disadvantaged in Israel coming primarily from Middle Eastern and North African cultural origins, and the disadvantaged in the United States coming primarily from American rural and inner-city poverty cultures.

Our assumption, on the other hand, is that the dominant factor to take into account is not the cultural origin of the disadvantaged groups in the two nations, but rather the common need of children in both settings to fit to the nature of the modernizing schooling processes and the modernizing societies characteristic of both countries. We see the dominant factor to be the phenomenon of "modernization," and "disadvantage" to be primarily a function of not fitting to the requirements of modernizing societies. Though the cultural backgrounds of the disadvantaged children in the two nations are surely different, and these differences need to be taken into account in designing the specifics of teaching, the processes to be used need to meet the same basic requirements in both settings. Hence the treatment methods need to be essentially the same in both locations if education of the disadvantaged is to succeed in either location.

The inference extending beyond Israel and America is that all countries having modernizing trends can share in their development of treatment methods for their disadvantaged populations. Seen so, the findings and rationale of this experiment would have relevance not only to the two specific national contexts in which the experiment was done, but prospectively, to any nation significantly involved in modernization.

With respect to the place of cognitive development in preschool education, it is commonly assumed that cognitive development is not an appropriate aim for preschool education; rather the appropriate aim is presumed to be social adaptation and individual expression. This view derives from the middle class orientation of advantaged homes in which cognitive development has been fostered by normal practices in those homes outside the school setting. Preschools are seen as instruments better used for affective socialization and self-expression without direct attention being given to cognitive development, as such. That this assumption is sound seems borne out by the ability these children display in their school work during first grade: they generally succeed; cognitive development done primarily at home has been adequate; a focus in school on peer relationships, social skills, a strengthened personality, artistic expression, esthetic cultivation, etc., seems justified.

With disadvantaged children, however, the story is otherwise: they fail in school when faced with cognitive tasks; their homes do not easily supply the conditions for cognitive development. We (and others) have, therefore, been brought to the contrary assumption that preschool education should focus directly on the cognitive

development of disadvantaged children while affective socialization and expression are taking place. Teaching methods for preschool education, both in Israel and in the United States, need to include cognitive development as a primary aim when serving disadvantaged children.

The inference extending beyond the limits of this specific experiment, is that the Western, modernizing frame of life requires of all its children, advantaged or disadvantaged, both cognitive and affective development however each may be supplied. Experience in meeting both needs within the school, as is required for the disadvantaged child, may eventually serve the advantaged child as well. However far the advantaged child may have been able to develop, traditionally, he may well be able to develop further under a well worked out teaching plan where cognitive development is more explicitly attended to and affective development is not penalized. The data and the rationale of this experiment would then have relevance not alone for preschool education of the disadvantaged, but for preschool education of the advantaged and therefore generally.

With respect to the role of drawing in child development, it is commonly assumed in preschool practice that drawing and other art activities are not usable for cognitive development; the arts are thought to be usable for affective development alone. Affective development of preschool children is thought to be disrupted by, rather than augmented by, simultaneous efforts to develop cognitive abilities. In consequence, teachers do not intervene in the drawing acts of children; they assume drawing serves its end only when the child uses it to express his own emergent images. He should not be asked to tell what is meant by the forms he makes, nor to try to form them so as to show himself and others what he knows about the world and could be seen as trying to communicate. He should not be asked to compare his drawings to the objects in his environment they might be taken to represent, etc.; rather, drawing should be reserved to serve a need to grow esthetically from the privacy of his internal mode of ordering, and not to serve his need to "know." Drawing, both in Israel and in the United States, is liberally used in preschools within this (traditional) frame of reference.

Our assumption, on the other hand, is that drawing can be used for cognitive development as well as affective expression and that drawing, when used for cognitive development, has its own unique contribution to make to the repertoire of means for generating cognitive development; it can be so used without necessary sacrifice of affective development. In fact, the disadvantaged child is not likely to be able to use drawing esthetically or any other way beyond a limited point, unless through the teacher's intervention, specifically applied, he comes to have enough he knows he knows to say that he will continue trying to draw to say it. Manipulative satisfactions he can gain from making marks when left alone, but beyond that minimal level of development, he can rarely go except the teacher intervene in behalf of his cognitive development.

The inference from this experiment is that under suitable conditions, drawing has a valuable use for purposes not heretofore generally entertained for it; it can develop cognitive abilities. Also inferred beyond the limits of this experiment, is that other forms of art, as well, may be so used if and when the teaching is suitably designed.

Rationale for the three alternative assumptions: Having cited above, three common assumptions which we see to misguide preschool education when disadvantaged children are involved, and having stated alternatives, we now extend the rationale for each alternative to show its meaning for the conduct of the experiment.

With respect to the locus of "disadvantage" and our rationale for assuming similarities in problems of teaching the disadvantaged in the two national groups, our reasoning is as follows:

A modernizing society is dynamic and complex. Its economy is based on technology. Technology requires specialization in workers and urban settings. Urban centers, in turn, require further specializations of function. Interdependencies of people increase; monitoring of the interdependencies becomes a primary function of the political system. The political system generates further specializations. As technology, urbanization, and political socialization evolve, innovations continuously enter the system to require changing abilities of the citizens, if the citizens are to stay productively abreast of the requirements of modernization and are to have a fulfilling life within its emergent structuring.

Educational programs and schools are the primary means by which such a society consciously undertakes to develop the abilities of its citizens to be productively relevant. A modernizing society requires a modernizing educational system so formed as to fit persons to benefit from the operations of the system, and to contribute to its further value for those participating in, and affected by it.

The "most advantaged" in a modernizing society are those who have most freedom of movement and choice within the system; they have abilities which allow them ready entrance into the basic channels of the system--economic, social, and political. Such advantage depends on advanced education to equip the person with knowledges adequate to guide choices and benefit from choices made.

The "most disadvantaged" are those whose movement and choice is least open, i.e., whose learnings are most limited with respect to fitting the system so that they are least able to function to fit and fulfill themselves in the structure.

The "disadvantaged" are, therefore, defined by a negative relation, i.e., they do not fit the system of modernization. They may

have inherited a "strong" and a "good" culture of another order, but strength and value of that culture is not the issue in question. The issue is cultivation of fit to a modernizing society wherein their lives are to be spent, and from which they are themselves to benefit while also benefitting their neighbors.

Modernization is a transnational characteristic of society in the Western World. Modernization in Israel is similar to modernization in the USA. What the disadvantaged need in each location is essentially the same, i.e., an education which educes behavior appropriate to the modernizing order. Even though there are marked differences between the cultures inherited by disadvantaged children from Yemen, Iraq, Morocco, the rural and inner-city poverty cultures of the USA, the crucial difference is not the difference of each of these from the other, but the difference of each from the one target of modernizing capability. The main task is teaching to generate that target capability no matter what the name may be of the culture the child may have inherited.

This does not mean that inherited cultures are not to be taken into account in teaching; indeed, they must be taken into account if the teacher is to enter into effective communication with the student and if the teacher is to fortify the student in his own valuing of himself and his inheritance--but the teaching which is done, granted communication and esteem, is to generate a new mode of behavior defined by degree of fit to a modernizing pattern.

This means that teaching methods which succeed in Israel with disadvantaged children should succeed as well in the USA and vice versa--if the methods are basic and if the teachers, in each case, take into account the specifics of language and cultural pattern that are requisite to meaningful communication in the course of using their methods.

The basic methods are to be the same since the behaviors are to be the same, defined by the modernizing end. Problems of teaching, too, will be essentially the same since the solution sought has a common form and aim.

Seen so, this experiment is designed to use the same teaching methods in Israel and the USA, offering a test of the foregoing assumptive ground and rationale.

With respect to the place of cognitive development in preschool education and our rationale for assuming the existence and importance of cognitive abilities as central to successful learning in school, our reasoning is as follows:

Cognitive ability is the ability to know "X" and to know one "knows" it. It involves (1) making a differentiation in something

one perceives or conceives, (2) recognizing one has been able to make the differentiation (it produces a "self-owned learning"; one has "done it himself"), (3) being able to use these self-owned differentiations in expressions or actions, and (4) recognizing the relation between what one differentiates and the choices such differentiations ("knowings") offer in the structuring of expression or action.

A learner whose cognitive abilities are well developed is a learner who realizes himself to have many useful and available learnings; he sees himself as a knower who knows with his knowings available for choice in forming his expression and action.

An educational program that succeeds in developing the cognitive abilities of children is one that succeeds in increasing the range of differentiations the children know themselves to be able to make, increasing the range of use of their differentiations in the structuring of expressions or actions the children know themselves to be able to carry out.

The greater the range of differentiations, the greater the prospect of making still more differentiations. The greater the range of differentiations which are self-owned, the greater the prospect that a child will see himself as able to act to increase his learnings still further. The greater the use of differentiations in the structuring of expressions or actions, the greater the prospect of using the differentiations in more expressions or actions. The greater the prospect that a child will see himself able to express or act to increase his learning still further, the greater the prospect the child will become his own teacher. The child is on his way to succeeding in his role in school and in his role as developer of his own mental functions. He can better mature as an intelligent human.

Cognitive abilities take on as many forms as there are modes of distinction. These modes follow the modes of perception, these being mainly, seeing, hearing, touching, and moving. They also follow from modes of conception, i.e., mainly, ideation and feeling.

In the process of experiencing, these modes of perception and conception deliver distinctions which are usable in forming the structure of outgoing expression and action. In their integral usage in action, the differing cognitive abilities come into functional interrelation.

The greater the range of cognitive differentiations (and their consequent interrelations), the greater the range of possible out-forming structures, and the greater the range of possible choices in forming those structures--i.e., the greater the range of possibilities for "self-owning of knowings useful in action."

"Self-owning of knowing" occurs when the knower realizes the relation between what he knows (what he has differentiated) and the choice that such knowing offers when he then structures his expression

or action. Having realized the relation between a knowing and its possible usage by him in his own course of action, he then not only knows--he "knows he knows," seeing himself as owner of that bit of knowledge. He has grown in his cognitive ability.

The development of cognitive abilities in children requires a circumstance in which the children can connect perceptual and conceptual differentiations to choices then open to them in forming their expression and action.

In summary terms, cognitive development depends on:

(1) being able to become involved in an experience

(2) being able to make a differentiation in something one perceives or conceives

(3) recognizing one has, himself, been able to make the differentiation (one has produced a "self-owned learning"; one has "done it himself")

(4) being able to use self-owned differentiations in expression or action

(5) recognizing the relation between what one differentiates and the choices such differentiations ("knowings") offer in the structuring of expression or action

(6) being able to sense, look for, and diagnose what one does not know in a given problem situation

(7) being open to, and desiring new experiences which will help to form further relevant differentiations, actions, and searchings for still further growth.

These abilities are familiar necessities for success in school. Each school subject (reading, writing, arithmetic, geography, history, etc.) is a system calling for ever increasing differentiations with correlative increases in integrations. One can come "to learn more and more," "to know more and more," "to do more and more," provided he can (1) "become involved," (2) "differentiate," (3) "self-own," (4) "express and act," (5) "relate knowings to doings," (6) "identify what he does not know," and (7) "seek further knowings for growing."

Having defined "cognitive development" in this manner, we can give meaning, also, to "affective development." The latter is not the negative of the former nor the dichotomous opposite of the former; it is rather that the two are aspects of the same phenomenon, i.e., the development of the child.

The semantic situation is similar when speaking of the height of a child and the weight of a child; each is an aspect of the one phenomenon, i.e., the child. The two are interrelated in the sense that a child of a given height would have some weight and a child of a given weight would have some height. The presence of one aspect does not deny the presence of the other, or oppose it; rather it affirms it. Each has its own distinctive measure (inches for height, pounds for weight), and there are advantages to using the measures when trying to follow or aid the growth of a child.

Similarly, cognitive and affective refer to two aspects of a child's development. There are advantages to making the distinction and creating measurements accordingly when trying to follow or aid the growth of a child.

When defining "cognitive development," above, we defined "development" with "cognitive" as an aspect thereof. The cognitive aspect, in reference to the drawings of children, is that of the drawings which reflect what the children know of the world in which they are living. We are then concerned with the drawing as revealing the properties and features of objects in the child's environment as the child has learned to note them. These objects come into the child's experience as already made and given, and the child has learning to do in coping with the world, thus composed. Measurements of this learning are then devoted to comparing the number and structure of features of those observed objects with the number and structure of correlative features the child has entered into his drawing. We are then trying to see what the child has learned of his surrounding environment as created and given.

When using the term, "affective," to apply to development, we are emphasizing what we can see in the drawings of children which reflect their knowledge of themselves as creators of drawings. Children develop not only as creatures adapting to a world, created and given, but also as actors in the world, creating their own forms, affecting the world in return with their creations within it. Human living entails a fitting transaction between the world and oneself, both the world and oneself receiving and giving to net for the human a fulfilling life for his mode of being. Maturing depends as much on a child's learning of himself as affective agent, affecting the world, creating within it, as on a child's learning of the world as a condition of givens, created. Measurements of affective learning are then devoted to comparing the forms and structure of his drawing to the forms and structure of himself as human creating through drawing, as "artist."

"Cognitive development," emphasized in this experiment, is defined and portrayed, above, as also inclusive of affective dimensions. While, for the teachers, focusing primarily on drawings as revealing what the children know of their world, the experiment sets the conditions for achieving such development through the child's "becoming involved in an experience," "recognizing he has, himself, been able to make the differentiation," "being able to use self-owned differentiations in

expression or action," "being able to sense, look for, and diagnose what he does not know, "being open to, and desiring new experiences for still further growth"--all phrases pointed to affective aspects of the child as seat and source for creation from his self. Were these features absent, there would be no development, cognitive or otherwise.

Subsequently, measurement devices will be presented and explained which will more clearly operationalize the meanings given in the context of this experiment to "cognitive" and "affective," as here discussed. In essence, the former measurements point to explicit knowns about objects in the world; the latter measurements point to implicit knowns about the self as creator through drawing. To the latter measurements we give the adjective "artistic" rather than "affective," both to acknowledge the role of the artistic as being primarily the affective development of man, and to avoid the clinging connotations of "affective" as popularly used to refer to "the emotions" in non-operational cul de sac fashion.

This experiment is designed to use drawing in teaching disadvantaged preschool children to foster "cognitive development," presuming affective development to be necessarily involved and instrumental thereto.

With respect to the role of drawing in child development and our rationale for assuming that drawing can be used in teaching for cognitive development, our reasoning is as follows:

Children enjoy the activity of drawing; they can become readily involved in the experience of drawing. Whether children are advantaged or disadvantaged, they appear to gain intrinsic satisfaction from their effort to draw. This means they have energy available for learning while they are involved in their drawing. Children are "favorably motivated."

Drawing calls for differentiations to be made in perceptions and conceptions. As the child draws to show a subject he remembers (or conceives), he is called upon to explicate, or differentiate, what he knows about the features of the subject. As the child perceives his drawing or looks at a model from which he wants to draw, he is called upon to clarify or differentiate its separable features and their mutual relations. He is challenged to generate knowings.

The act of drawing and the products of drawing can readily be taken by a child as self-owned. Whereas, in many activities, like reading and writing, adults step in to require the act and to make preemptive judgments as to what is "right" and "wrong" about the child's products, adults are inclined to take drawing as something a child can do for the intrinsic satisfaction of it; children can draw for their own enjoyment and without adult preemptive judgments about what is right and wrong in their products. Children can, therefore, take the activity as self-owned rather than other-owned; they can experience themselves as makers of their own makings, creators of their own creations, and knowers of their own knowings.

Drawing allows the child to organize his knowings in outgoing expression and action. He can realize what he knows by using his knowings in forming his drawings. He can function as a responsible person, showing his knowings in public, revealing himself to himself and "significant others." He has something of his own to share and to offer to others. He can "make his mark in the world" and experience the power of shaping the world in his image of it. Through his expression and action, he can experience the value of knowing.

While drawing, the child can experience the making of choices. He can recognize the relation between his knowings and the alternatives they offer when forming a particular drawing. He can be challenged to refine what he knows and to differentiate further in forming what fits and does not fit in the drawing. He can sense the connection between knowing more and having more freedom to gain what he wants in his action.

Through drawing, a child can be led to new ways of experiencing his world. Sustained by his ability to do what he can do in putting his experience into expressed and visible form, he is prepared to invest additional energy in looking at other subjects in his environment as though they too might yield to his drawing them. Having a way to use what he knows in his own action from it, he can afford to open himself for the inclusion of further data of similar order which he might also be able to put to use. He can grow in his observation of the world and in his differentiations of that world as he can see it and act upon it.

He can develop cognitively in ways that can help him, not only in drawing, but in thinking (more to think about), in speaking (more to say), in writing (more to refer to), in arithmetic (more "sets"; more experience in adding to, subtracting from, dividing, equalizing, balancing, etc.): in reading pictures and making them; in problem-solving, etc.--all abilities that can help him succeed in school and in the modernizing society in which he is to live out his life.

This experiment is designed to exploit the intrinsic challenges to growth that drawing affords when consciously and explicitly used for cognitive development, the aim being to strengthen children in operations essential to their later success and growth in a modernizing school and society.

B. The Problem of Application; Rationale for Participation of Teachers in the Diagnostic Study and Experiment

It is commonly assumed that experimental research comes in two phases, one the production of knowledge in the special setting of the experiment and the other, the diffusion of that knowledge by getting it to be adopted (or "applied") in actual field circumstances.

Because knowledge produced in laboratory settings has proven difficult to diffuse into field settings, we have come to speak of "the problem of application."

We hold that much of the problem is solved if a separation is not made in the first place between the settings in which knowledge is produced and the settings in which it is applied. If knowledge is to be used by teachers, it should be produced by teachers in the situations in which they work. The problem, then, is to so design the experiment that teachers are principal participants in it.

The role of the research-experimenters is to teach teachers ways in which they can experiment; the knowledge they gain is then their own knowledge; already engaged in the actual situation in which their knowledge is applied, there is no break between the creation of that knowledge and its use in action. The teachers directly benefit, and the findings thus produced have a form which similar teachers, similarly placed, can recognize as relevant. "Diffusion" beyond the borders of the specific experiment is then more readily possible.

This process calls for a rationale by which the research-experimenters see themselves developing the teachers in ways which are consistent with the ways in which the teachers are then to develop their children. Where the aim is the cognitive development of children, as in this case, a rationale is called for which equally well includes the cognitive development of teachers. The two goals inter-function.

The following is the rationale by which we have designed the experiment to include the cognitive development of teachers in the course of their experimentation to develop the cognitive activities of children:

The principles which prescribe the conditions for cognitive development in children are principles which also prescribe the conditions for cognitive development in teachers; namely, the teachers need (1) to become involved, (2) to differentiate, (3) to self-own, (4) to express and act, (5) to relate their knowings to their doings, (6) to identify what they do not know, and (7) to seek further growth.

For the teachers, their central engagement is in experimental teaching; for the children, their central engagement is in drawing.

What the teachers need is (1) to become fully involved in the experience of experimentation in teaching; (2) to differentiate their perceptions and conceptions with respect to their teaching disadvantaged preschoolers through drawing; (3) to self-own their knowings and doings; (4) to express themselves through action in teaching to reach their objectives; (5) to see the relation between what they know and their choices in forming their courses of action; (6) to identify what they do not yet know and, therefore, need to learn; and (7) to extend their experience still further through searching for still further knowing and doing.

In more general language, the teachers need to be full partners in the experiment; they need to believe in what they are doing; they need to understand fully the ground for their action; they need to see themselves as able to gain their own intrinsic rewards for their efforts.

Teachers will be open to involvement in the experiment if they can begin with what they already feel to be reasonable. They are accustomed to certain ways of thinking and doing. A rationale is required by which they can see their tasks in the proposed innovations as extensions from the base of what experience has already taught them.

A "traditional group" can be set up without any problems in getting the participation of the teachers. The methods will be those already practiced in respect to the uses of drawing. These methods are based on traditional conceptions derived from experience with advantaged children, i.e., drawing is to be used primarily to foster self-expression; cognitive matters need not be given special attention. The logic is that what is good and workable with advantaged children will be found to be good and workable with disadvantaged children; the problem is only to see that the disadvantaged have opportunities which are similar to, and quantitatively equal to, those provided the advantaged. This is the assumption of the traditional method.

Experience with the disadvantaged, however, has shown many teachers that similar and quantitatively equal opportunities for drawing will not enable disadvantaged children to produce drawings equal in quality to the drawings produced by advantaged children. The quality of drawings done by the disadvantaged is much lower. This poses a problem to which many preschool teachers are now prepared to give attention. With leadership in exploring new methods, they should be willing to try innovations if the innovations use methods which, to the teachers, are understandable and workable in the context of the already familiar.

Teachers are accustomed to using discussion in much of their teaching. They can see that discussion might contribute to drawing if the children discussed a subject-to-be-drawn before and during and after the drawing of it. Being freshly alerted to features of a subject, the children could better have in mind what they could put in their drawings and the drawings might then be better. Teachers should be willing to undertake a "discussion method."

Teachers can also see that, in addition to discussion, the children might be helped through presenting models of the subjects they are trying to draw. Drawings are visual structures and so, also, are such models. By freshly observing the visual structure of models, the children might be helped to know what they could try to put into their drawings, and the drawing might then be better. Teachers should be willing to undertake an "observation method."

Teachers can see that discussion and observation might work still better if, in addition, the children had the models up close to them where they could touch and handle them as well as observe them, before and during their drawing. The experience of touching the models and having the models immediately confronted might add strength to the "knowing" so that children might do their drawings still better. Teachers should be willing to undertake a "touch method."

Teachers can see that the problem for children might not be simply knowing the subject as offered in models, but in having the skills required for making the drawing so that the drawing can show what the children know of the subject. By teaching the technical skills of drawing, the children might be helped to do better drawings than discussion and observation alone could engender. Teachers should be willing to undertake a "technical training method," provided they had the help of supplemental teachers in art who know how to do the technical training.

Teachers should be willing, then, to use the traditional method and to experiment in the use of a "discussion method," an "observation method," a "touch method," and a "technical training method."

C. Rationale for the Five Teaching Methods

Having considered grounds for participation of teachers in the experiment, and having considered teaching methods the teachers may find reasonable to employ, we now give attention to these methods from the points of view of the developmental needs and potentialities of the children.

Analysis of child-rearing practices in the homes and communities of the disadvantaged children, as compared to the advantaged, reveals wide discrepancies in (1) opportunity to draw, (2) adult support for drawing, (3) cognitive involvement in drawing, and (4) learning technical skills in drawing. Disadvantaged children have little or no help on these matters; advantaged children often have a great deal of help.

The assumption is made that if disadvantaged children are to be brought to higher levels of performance, the necessary help will have to come through what is done in school. The challenge is therefore to provide compensatory aid to disadvantaged children in school, and to find ways of teaching which succeed in providing the necessary (1) opportunity, (2) support, (3) cognitive involvement, and (4) technical skill.

As among the five groups of children to be taught by the five teaching methods, we want opportunity to be equalized in the sense that the amount of time given to drawing, and the amount and kind of drawing materials supplied, should be the same for all groups. As

among the five, we want support to also be equalized in the sense that teachers in every group will warmly receive what the children draw, and will encourage the children in doing their work. The primary experimentation is to be in the kind of cognitive involvement provided, and in the degree to which technical skill in drawing is directly emphasized.

More specifically, our rationale for the teaching methods is as follows:

"The Traditional Method" (The Control Group): This method is not to emphasize either cognitive development or development of technical skills. The children are to be given plenty of materials for drawing and are to be encouraged to draw. Their drawings will show some of what they know of the subjects they draw, but there is to be no consistent or intentional effort to direct the attention of the children to features of the subjects which they know and might show in their drawings. The aim is not "knowing," but the enjoyment of the act of making drawings. The children are to be helped with technical problems in the use of drawing materials when they show they could benefit from simple suggestions, but they are not to have their attention focused on technical problems, as such. The aim is to prevent discouragement in drawing rather than to develop technical abilities, as such.

"The Discussion Method" (Experimental Group I): The aim is to amplify what the children can know of the subjects they draw by discussing those subjects in advance of, during, and after their drawing of those subjects. Words are a form of cognitive knowing. They can be used to call the attention of the children to what they remember of features of the subjects to be drawn. Words are especially useful for the naming of features: e.g., when the subject is "house," to recall "doors" and "windows" and "steps" and "roofs" and "walls" and "cottages" and "apartment houses," etc. Words can be used to differentiate the functions and forms of the features so that the children can increase in their conscious knowings of parts and their interrelations. Drawing can then be approached by the children as a way of showing their substantive knowings.

In this method, the children work from what they remember (without supplemental effort to look at models of the subjects they are drawing, as is done in subsequent methods); they draw from what their experience has already granted them, amplified by discussion with the teachers and other children in the classroom setting.

When a child has completed his drawing, the teacher talks to the child about his drawing, supporting the child in what he has been able to accomplish while specifically pointing out what he has been able to show in his drawing of what he knows about the subject, and adding suggestions as to what further features the child might

readily be able to include in his later trials at drawing the same subject. The aim is to encourage the child to value his present and later work, to value his "knowing," and to value drawing as a way of showing how he is coming to know more about the subjects he gives form to in his drawings.

The aim is also to help the child understand a role a teacher can take which can add to the child's enjoyment of his own present and growing accomplishment; to a child, an adult in the role of a teacher need not inevitably turn out to be a powerful figure bent on enforcing his will; he can be a person to whom a child can communicate his offerings, his trials, his knowings, and his need to be growing. "Criticism," as teachers can do it, can come to be more readily accepted for what it needs to be, i.e., a source of structuring by which a child can grow in his self-owned path to development.

In respect to technical problems in drawing, the teacher (as in the Control Group) is to offer simple suggestions to the child but with no direct attention given to technical problems as such.

"The Observation Method" (Experimental Group II): This method is to be used along with the discussion method (as in Experimental Group I) to amplify what the children can know of the subjects they draw by looking at models of those subjects. Actual subjects or models of them are to be brought into the classroom where children can have their attention freshly focused on the visual features of the subject. In connection with discussion of the subject, the children are to be taken to the model where they can get a good look at it and have its visual features explicitly pointed out to them. They are then to return to their tables and to draw as they wish, i.e., either from memory or from glancing again at the model.

Visual forms, as well as words, are a way of cognitive knowing. Drawings are done as visual forms and are comparable to the visual forms of their subjects. In addition to the substantive naming of parts through words used in discussion, the children can differentiate the parts in terms of visual forms and relations; they can see what is higher and lower, on this side and that side, above and below, smaller and larger, darker and lighter, etc. They can show these knowings through drawing.

When a child has completed his drawing, the teacher is to talk with the child about his drawing as outlined for Experimental Group I, but with the additional possibility of calling the attention of the child, again, to the visual model.

In respect to technical problems in drawing, the teacher (as in the Experimental Groups I and II and the Control Group) is to offer simple suggestions but with no direct attention given to technical problems, as such.

"The Touch Method" (Experimental Group III): This method is to be used along with the discussion method (as in Experimental Groups I and II) and with the observation method (as in Experimental Group II), to amplify what the children can know of the subjects they draw by touching them and moving their fingers around and over the subject and its component features. The models are to be placed on the tables where the children are drawing and are to be left within range of their being reached while the children are doing their drawings. In connection with discussion of the subject and its observation, the children will touch the model and its various features to gain from their handling of it some additional knowing that words, alone, or observation, alone, would not have provided. While drawing, the children will thus be intimately confronted with what they have just touched and felt-out directly in front of them.

The models are then not only verbal models and visual models, but also touchable realities to be experienced through tactile and kinesthetic sensation. As fingers move over the model of a house, for example, the children can confirm that doors and windows and walls and roofs and houses have borders, that larger forms take longer to stroke all around than do smaller forms; that one reaches up to the higher and down to the lower, that one goes horizontally across the walls to reach, left and right, to their borders, etc. These kinds of motions and touchings are also involved when the children try, in their drawings, to make on their papers so as to show borders, up and down, and across, and all in proportion. Cognitive knowing has its tactile and kinesthetic rendition as well as its verbal and visual rendition, and these renditions of knowing are also involved in the making of drawings.

When a child has completed his drawing, the teacher is to talk with the child about his drawing as outlined for Experimental Groups I and II, but with the additional possibility of calling the attention of the child, again, to the model directly confronted and still available for touching and feeling.

In respect to technical problems in drawing, the teacher (as in the Experimental Groups I and II and the Control Group) is to offer simple suggestions but with no direct attention given to technical problems, as such.

"The Technical Training Method" (Experimental Group IV). This method is to be used along with the discussion method (as in Experimental Groups I, II, and III) and with the observation method (as in Experimental Groups II and III, but without "touching"), to amplify what the children can do, in their drawings, to show what they know of their subjects.

The aim is to give attention directly to ways of drawing on paper that can enable the children to better do what they may want and need to do to show, in their drawing, what they know of features of their

subjects. The teacher is to take time out from discussion and observation, as such, to deal with the making of forms on paper that are like those required in much of their drawing if they are to ow the forms that visually appear in their subjects. They are to draw squares and rectangles, circles and ovals, triangles, small forms of these included in larger, etc. They are to make shaded masses to show forms that are darker compared to what's lighter. As they become able to make these forms in their drawings, they are then to be involved in discussion and observation of subjects, while noting the presence of similar forms in their subjects; e.g., in houses, while noting the rectangular forms that appear in the walls, the doors and the windows with variable sizes, and the darker masses that show in the shadows; or, in people, the oval shapes that show in the bodies and limbs, and the contrast in shading that comes in the clothing. Cognitive knowing comes not only in forms suited to saying and seeing, but in forms as well, of doing in drawing; expression is aided by suitable structures.

When a child has completed his drawing, the teacher is to talk with the child about his drawing as outlined for Experimental Groups I, II and III, but with the additional possibility of calling the attention of the child to similarities in form as between what appears in the models and what is then needed in rendition through drawing.

In this Experimental Group, as different from all the others, the teaching is thus to give direct attention of technical problems in drawing.

Overall Design: With respect to the essentials of (1) opportunity, (2) support, (3) cognitive involvement, and (4) technical skill, the total design is, therefore, so laid out that all five groups are to be "equated" for "opportunity" and "support," four are to be experimental in their modes of "cognitive engagement," and one, while cognitively involved, is also to be involved in giving direct attention to "technical skill."

The overall design provides a progression in kinds of challenge to cognitive knowing as follows:

(1) no challenge; Control (traditional) Group

(2) challenge through verbal differentiations; Experimental Group I

(3) challenge through visual differentiations, in addition to challenge through verbal differentiations; Experimental Group II

(4) challenge through tactile and kinesthetic differentiations, in addition to challenge through verbal and visual differentiations; Experimental Group III

(5) challenge through technical training in drawing, in addition to challenge through verbal and visual differentiations; Experimental Group IV

The table on the following page shows the variables to be explicitly included in the five teaching methods.

Summary

Restating on the dimensions already employed in forming the rationale, we may summarize the overall conceptualization of the experiment in the following ways:

Needs motivating the experiment: From prior experience in the social context of education, we were motivated to seek the following:

(1) effective preschool education for disadvantaged children

(2) cognitive development of preschool disadvantaged children

(3) specific ways of teaching for cognitive development

(4) new ways of teaching

(5) a functional equivalent for reading and writing at preschool level

(6) use of drawing

(7) use of drawing as an art form, having both affective and cognitive dimensions

(8) use of methods meaningful to teachers in service

(9) use of teachers as primary participants in generating knowledge while being in position to use it

(10) experimentation which meets "the problem of application"

(11) international collaboration in recognition of a common need in modernizing nations for effective education of disadvantaged children

Purposes guiding the teaching: With the above needs in mind, we generated a (limited) experiment in teaching to try

(1) to develop the cognitive abilities of preschool disadvantaged children

(2) to do so by methods of teaching which use drawing as the primary teaching medium

TABLE 1

Variables to be Explicitly Included
in the Five Teaching Methods

Variables in teaching	Teaching Groups				
		Experimental			
	Control	Discus-sion	Observa-tion	Touch	Technique
Opportunity in time and materials	X	X	X	X	X
Support of child by teacher	X	X	X	X	X
Teacher discussing product with child		X	X	X	X
Verbal differentiation of features of subject: words employed		X	X	X	X
Visual differentiation of features of subject: observation employed			X	X	X
Tactile and kinesthetic differentation of features of subject: touch employed				X	
Specific technical training in drawing					X

(3) to compare the effectiveness of five methods, one traditional and four new

(4) to run parallel programs on a group of Israeli disadvantaged preschool children and a group of American disadvantaged preschool children in order to compare their characteristics as "disadvantaged" and their patterns of response to the same teaching methods

Assumptions taken as basic: Guided by these purposes, we could not design a suitable experiment apart from reexamination of certain common assumptions which were standing in the way, and which, therefore, required alternative forms of statement, as follow:

(1) Though disadvantaged children may come from widely diverse cultural backgrounds, and may, therefore, seem to require correspondingly different patterns of education, their educational need proves out to be a common need; i.e., to develop those abilities which enable them to fit into, and benefit from, the common modernizing society into which they are being inducted; an educational program that succeeds in developing these abilities in one disadvantaged group in one modernizing society should also have good possibilities of success in developing similar abilities in another disadvantaged group in the same or another modernizing society.

(2) Cognitive development is essential for preschool children in order that they be able to succeed in schools which are designed to educate children for the choices available in a modernizing society; affective development of preschool children is also essential, but not adequate alone, to insure the success of disadvantaged children; for them, preschool education needs to offer both cognitive and affective development in one integral teaching design.

(3) The role of drawing in child development can be that of cognitive development as well as affective development; drawing, and other of the arts, need not be restricted in their use to the purpose of affective development alone; drawing has particular values for cognitive development.

Theories introduced: In order to build on these assumptions, it was necessary to generate theories concerning:

(1) disadvantage, seen as a function of modernization which depends on the kind of abilities needed for success in school

(2) cognitive development, seen as requiring a certain set of opportunities and reinforcements

(3) drawing as a medium for cognitive development, seen as affording opportunities and rewards for growing in knowings

(4) experimental design for applied situations, seen as requiring practitioners to be primary participants in creating the knowledge they are to use

PART II - DIAGNOSTIC STUDY

This part of the study focuses on questions having to do with the basic abilities of the children and teachers to do what the experiment presupposes them able to do if benefit is to be derived from the proposed teaching program.

The first need was to clarify and state these questions; this is the substance of Chapter III, captioned "The Leading Questions."

The research sample of disadvantaged preschool children in the two national settings had to be selected; new tests had to be conceived and constructed; relevant scoring procedures had to be created; the reliability and validity of the new tests had to be checked; and the appropriate statistical procedures had to be determined for processing the data. These items are the substance of Chapter IV, captioned "The Research Operations."

Basic assumptions and underlying theory had to be focused into the form of hypotheses; hypotheses had to be stated in testable form and related to data which would test them; and interpretations of the findings had to be made, relating the data to the underlying assumptions and theory. These items are the substance of Chapter V, captioned "Hypotheses: Derivation, Data and Interpretation."

CHAPTER III
THE LEADING QUESTIONS

Here we state the questions on which we focus in the diagnostic study. They compose five directions of inquiry concerning the capabilities of preschool disadvantaged children and their teachers when drawing is to be used as a primary means of child development.

(1) Do preschool disadvantaged children show a "generalized drawing capability"? Do they show consistency in their level of cognitive ability when drawing different subjects, or does their level of cognitive ability vary, inconsistently, from subject to subject? Do they show consistency in their level of artistic ability when drawing different subjects, or does their level of artistic ability vary, inconsistently, from subject to subject?

(2) Do preschool disadvantaged children show their level of cognitive ability in drawing to be positively related to their level of artistic ability in drawing, or do they show lack of relation, or negative relation, between these two aspects of their drawing capability?

(3) Do preschool disadvantaged children show their level of cognitive ability in drawing given subjects to be positively related to their level of verbal ability in describing those same subjects, or do they show lack of relation, or negative relation, between these two modes of expressing their knowledge? Do they show a generalized level of knowing about given subjects which they can express in either medium, or do they show their knowledge of given subjects to be specific to the medium used in expressing that knowledge?

(4) Do preschool disadvantaged children in an American setting perform at levels similar to preschool disadvantaged children in an Israeli setting with respect to drawing ability (cognitive and artistic), related verbal abilities, and the factors of sex, age, and IQ?

(5) How do the assessments of the drawings of preschool disadvantaged children, as made by their classroom teachers, compare with the assessments of the same drawings, as made by art teachers who are relatively more experienced and specialized in evaluating children's drawings? Are the classroom teachers able to do what they need to be able to do?

These five research questions guide the structuring of the research operations described in the next chapter (IV); they also lead into five areas of concern when, in Chapter V, hypotheses are stated, data are presented, and interpretations are made.

CHAPTER IV
RESEARCH OPERATIONS

Here we are concerned with sampling, the procedure in developing the test instruments needed, the reliability and validity of the tests, and the statistical procedures followed in treating the data.

A. The Sampling and Testing Procedure

1) The sample: The research sample includes four groups of culturally disadvantaged preschool children randomly selected in 52 prekindergarten and kindergarten classrooms in America and Israel: a group of 125 prekindergarten children plus a group of 130 kindergarten children randomly selected in 20 classrooms in America; and a group of 90 prekindergarten children plus a group of 98 kindergarten children randomly selected in 32 classrooms in Israel.

TABLE 2

Composition of the Research Sample

	American Sample	Israeli Sample	Total Sample
Groups	No. of children	No. of children	No. of children
Prekindergarten	125	90	215
Kindergarten	130	98	228
Total	255	188	443

The procedure in testing the children included in the four groups was as follows:

2) Testing procedure for the Israeli sample: The 188 randomly selected children included in the Israeli sample were tested together with all other children in their classrooms. Neither the classroom teachers nor the research assistants (who were present at the time of testing in these classrooms) knew who the randomly selected children included in the sample were.

In the presence of a research assistant, all the children in each classroom were asked by their teachers to do three drawings, one per day, for each of the following subjects: 1) man, 2) house, 3) a radio set.

Each teacher said to the children in her classroom: "Here you have paper, pencils and erasers. Please draw for me a man. Try to make it the very best man you can." When a child stopped drawing, he was encouraged, one time only, by the teacher or the research assistant (present in the classroom at the time of testing) in the following manner: "You are drawing very nicely. Are you finished or would you like to try some more and draw the very best man you can"? Each child was given as much time as he wanted.

When a child said he had finished his drawing, he was asked by the teacher or research assistant: "Tell me, what did you draw"?, and whatever the child said was written down by the teacher or by the research assistant on the back side of the drawing. The child's name was also written on the back side of the drawing.

Using the same procedures, the children were asked on the next day to do a drawing of a "house," and on the following day, to do a drawing of a "radio set."

In the 32 classrooms, there were 976 children; we then had 976 drawings of each of the three test items. Without the knowledge of the classroom teachers as to whose drawings were selected for the research sample, the researcher selected (by names on the back) the 188 drawings of each test item for the "randomly selected sample."

After the work on drawing was thus finished, the research assistants tested each of the 188 selected children on their verbalization with respect to the subject "man." The testing was done individually. The child was asked to "tell me all a man has, everything a man has." When the child stopped talking, he was encouraged to say more in the following manner: "Very nice. Now tell me some more things you can think of that a man has." This was done but once for each child. The child's verbalized concepts of features of a "man" were recorded.

3) Testing procedures for the American sample: The procedure which was followed in obtaining the test drawings and verbal records for the Israeli children were replicated for the American children; the instructions to the children were the same, the roles of the teachers and research assistants were the same, the interval of one day for each test drawing was the same. We were able, however, to increase the range of the testing by increasing the number of test items, both on drawings and on verbalization. In addition to "man," "house," and "TV set" (substituted for the Israeli "radio set"), we included the test items of "tree" and "combination" (man + house + tree) for test drawings, and "house," "TV" and "tree" for the verbal concepts.

In the 20 American classrooms, there were 506 children; we then had 506 drawings of each of the five test items. Without the knowledge of the classroom teachers as to whose drawings were selected for the research sample, the researcher withdrew the drawings of the random sample of 255 children. After the drawings were done, the research assistants tested each of the 255 selected children individually on their

verbalization with respect to the subjects of "man," "house," "tree," and "TV," (these tests being given one day apart for each test item), following the same instructions as had been used for the Israeli group, and recording the verbal concepts for each test item in the same manner.

In the following table are listed all the drawings and verbal descriptions done by the American and Israeli samples.

TABLE 3

Test Items Used

American Sample		Israeli Sample	
Drawings	Verbal Descriptions	Drawings	Verbal Descriptions
1) Man	1) Man	1) Man	1) Man
2) House	2) House	2) House	--
3) TV set	3) TV set	3) Radio set	--
4) Tree	4) Tree	--	--
5) Combination (Man + House + Tree)	--	--	--

In later chapters, when comparisons are made of results from the two national groups, the test items used for the American children are the same as the test items available from the Israeli sample. When reports are made on either national group independent of the other, the full range of test items available to that national group is used; the range is therefore greater for the American report than for the Israeli report.

B. Derivation of the Sample

Our sampling procedure included two stages:

1) First stage of sampling: In the first stage, 52 prekindergarten and kindergarten classrooms were randomly selected in nine culturally "disadvantaged" areas in the two cities of Columbus, Ohio and in Tel-Aviv.

In Tel-Aviv, 32 classrooms (16 prekindergarten and 16 kindergarten) were randomly selected in four culturally disadvantaged areas (eight classrooms in each area), and in Columbus, 20 classrooms (10 prekindergarten and 10 kindergarten) were randomly selected in five culturally disadvantaged areas (4 classrooms in each area).

In Columbus, all the classrooms were located in "Title I" schools; in Israel, all the classrooms were identified by the Ministry of Education as "Teunej Tipuach," i.e., as enrolling culturally disadvantaged children.

2) Second stage of sampling: In the second stage, 443 prekindergarten and kindergarten children were randomly selected from a total of 1,482 children enrolled in these 52 randomly selected classrooms in the two nations.

In Tel-Aviv, 188 prekindergarten and kindergarten children were randomly selected from a total of 976 children enrolled in the 32 randomly selected classrooms. In Columbus, 255 prekindergarten and kindergarten children were randomly selected from a total of 506 children enrolled in the 20 randomly selected classrooms.

We wanted the number of prekindergarten and kindergarten children to be similar in our research sample. Since the number of prekindergarten children in America is smaller than the number of kindergarten children, this resulted in our taking every second child at random from the 10 classrooms of prekindergarten children, and every third child at random from the 10 classrooms of kindergarten children. This gave us 125 prekindergarten and 130 kindergarten children for our American research sample. In Israel, the proportions in the two grade levels were approximately equal, allowing us to take every fifth child at random from the 16 classrooms of prekindergarten children and the 16 classrooms of kindergarten children. This gave us 90 prekindergarten children and 98 kindergarten children for our Israeli research sample.

The following table provides the summary figures on sampling.

TABLE 4

Derivation of Research Sample

	American			Israeli			Total Pool American & Israeli Children		
	# of classrooms	Children # taught	Children # tested	# of classrooms	Children # taught	Children # tested	# of classrooms	Children # taught	Children # tested
PreK	10	200	125	16	480	90	26	680	215
Kdg.	10	306	130	16	496	98	26	802	228
Total	20	506	255	32	976	188	52	1,482	443

In Columbus, 92% of the children were black, coming primarily from American rural and inner-city poverty cultures; in Tel-Aviv, 96% of the children came primarily from Middle-Eastern and North-African cultural origins. The parents of these children, in both countries, were in low educational and low occupational status. In America, 60% of the children had no fathers in their homes; in Israel, only 2% had no fathers in their homes.

The mean age at time of testing was 5 years and 4 months for the total pool of children; the American children averaged 6 months older than the Israeli children. The mean IQ (as measured by the Harris-Goodenough Draw-a-Man Test) for the total pool of children tested was 84; the American children averaged 5 points more than the Israeli children.

TABLE 5

Grade, Sex, Age and IQ
of Children Included in Research Sample

		American	Israeli	Total Pool
	Number of cases	No.	No.	No.
1) Grade	Prekindergarten	125	90	215
	Kindergarten	130	98	228
2) Sex	Boys	117	103	220
	Girls	138	85	223
3) Total		255	188	443
4) Age in months		66.8 (Means)	60.7 (Means)	64.4 (Means)
5) IQ (Harris Draw-a-Man Test)		86	81	84

C. Derivation of Test Items

We based our choice of the drawing and verbal test items on free drawings made by a preliminary sample of prekindergarten and kindergarten children. We have chosen, as test items, the most frequently drawn subjects in children's free drawings and one very rarely used subject in children's free drawings, in the following manner:

1) Procedure in selecting test items based on a preliminary sample of Israeli children: Two hundred free drawings of prekindergarten and kindergarten "advantaged" and "disadvantaged" children were analyzed in order to find what subjects are drawn by the majority of preschool children when they are free to draw any subject they wanted. These drawings were obtained from a preliminary sample of 200 prekindergarten and kindergarten children enrolled in 20 classrooms in Israel. In ten of these classrooms (five prekindergarten and five kindergarten), the majority of children came from middle and higher socioeconomic homes, and in ten classrooms (five prekindergarten and five kindergarten), the majority of children came from lower socioeconomic homes.

From a list of names of all the children in these 20 classrooms, the researcher selected at random 10 children per classroom. Each classroom teacher made arrangements so that she stayed with the ten randomly selected children in class while all the remaining children played outside on the playground. In the presence of one of the research assistants, the teacher asked the children (each child at a separate table) the following: "Here you have paper, pencils and erasers. Please draw for me what you most like to draw and try to make it as beautiful as you can." The child was given as much time as he wanted. When a child finished his drawing, he was asked by the teacher: "Tell me, what did you draw"?, and whatever the child said was written down by the teacher on the back side of the drawing.

A number of these 200 drawings were complete enough in their depictions of a given subject to be recognized by the researchers as a drawing of that subject, and when compared with the word description the child had given for what he was trying to draw, there was agreement between what the researchers took the drawing to represent and the verbal identification of subject as given by the child. But the remaining drawings were not complete enough in their depictions of a given subject; the researchers could not recognize from the drawing what subject the child was trying to draw and had to refer to the word description given by the child. By referring to the verbal descriptions on the back of the drawings, we obtained a total list of 200 names for the subjects the 200 Israeli children in the preliminary sample were undertaking to draw. The two most frequently drawn and named subjects were: 1) a human being (man, woman, boy, girl, baby, etc.), 2) a house. These two subjects were then chosen as test items for the measures of drawing and related verbal cognition in the Israeli research sample. A third subject, a radio set, was then added, not because it was popular with the children, but because it was rarely used by them (chosen by 10 children in the 200 cases), and could serve as a relatively stringent test item of learning to draw.

When the drawings were separated according to whether the children were "advantaged" or "disadvantaged," the themes of human being and house remained the most frequent choice for both groups, and for both groups, radio set was rare.

2) Procedure in selecting test items based on a preliminary sample of American children: One hundred free drawings of American prekindergarten and kindergarten disadvantaged children were later obtained and analyzed in order to find what subjects were most frequently drawn by American disadvantaged preschool children when they were free to draw any subject they wanted. These drawings were obtained from a preliminary sample of 100 prekindergarten and kindergarten children enrolled in ten classrooms in two disadvantaged areas near Columbus. Ten children were randomly selected from each classroom.

The procedures in obtaining the free drawings, in getting each child's name for what he was trying to draw, and in assembling the list of 100 names for the subjects drawn by the 100 children were the same as for the Israeli preliminary sample.

The four most frequently drawn and named subjects were: 1) a human being, 2) a house, 3) a tree, 4) a combination drawing including a human being plus house plus tree. These four subjects were then chosen as test items for the measures of drawing and related verbal cognition in the American research sample. A fifth subject, a TV set, was added because it was rarely used for drawing by the American children (chosen by seven in the 100 cases) and could serve as a relatively stringent test item of learning-to-draw for the American children (comparable to the radio set for the Israeli sample).

D. Development of Assessment and Scoring Procedures for Tests of Drawing

We undertook to develop test instruments which preschool teachers would feel free to use in assessing and teaching their children with respect to cognitive development as revealed in drawings; we also undertook to develop test instruments which art teachers would find valuable to use as clarified and more systematic means of expressing their judgments of children's drawings, both with respect to cognitive and artistic aspects.

1) Development of assessment and scoring procedures for preschool teachers: At the present time, the general assumption is that preschool teachers are unable and should not make critical evaluations of children's drawings. Preschool teachers also feel themselves to be unable to make such evaluations, assuming that such judgments can properly be made only by those who have specialized in drawing as an art form, and more particularly, as an art form for children.

Our assumption is that while drawing is an art form meriting specialized attention, it is being approached by preschool disadvantaged children at a level which lends itself to judgments which preschool teachers can make quite effectively, provided the teachers are aided by instruments they can use and can gain confidence in their own evaluational abilities.

We began work on criteria for evaluating and scoring the drawings by studying the free drawings obtained from the disadvantaged children in the previously described Preliminary Sample (100 each from Israel and the United States). We supplemented the free drawings already obtained by adding 168 drawings made by 56 randomly selected children, taking every fourth child from the 200 disadvantaged children in the Preliminary Sample. We call these 56 children our Second Preliminary Sample; it is composed of 28 children in each of the two national groups, each national group being composed one-half of prekindergarten children and one-half of kindergarten children.

A research assistant returned to each of the classrooms from which free drawings had been collected, and asked the two (or three) randomly selected children included in the Second Preliminary Sample from that classroom to make a drawing of a man, using the following instructions to the children: "Remember last time you drew for me beautiful drawings? This time will you please draw for me a man. Here you have paper, pencils and erasers. Every one of you will draw for me a man. Try to make it the very best you can." When a child stopped drawing, he was encouraged, one time only, by the research assistant in the following manner: "You are drawing very nicely. Are you finished or would you like to try some more and draw the man the very best you can"? Each child was given as much time as he wanted. On the next day, the children were asked in the same manner to draw a house, and a day later to draw a radio set (or TV set). Having three drawings per child for each of the 56 children, we had a total of 168 drawings.

We then gave the 56 drawings of man (from the Second Preliminary Sample) to two art educators, experienced with the art of young children, asking that each look at each drawing and, on the basis of his general impression, place it in one of four piles: the first pile for the "best" drawings, the fourth for the "worst" drawings, and the two intervening piles for the implied intermediate positions. Having thus rated the drawings of man, they were asked to rate the drawings of house and of radio (or TV) in similar fashion.

The mean interreliability between the two art teachers for the three tasks was .81.

We looked carefully at the piles of drawings of the three subjects (man, house, TV) as evaluated and rated by the two art teachers, and tried to compare them, taking into consideration the major features that differentiate the piles, and the question of whether or not these features could be used as a suitable base for an evaluation plan that preschool teachers would be willing and able to use.

We found two major features to characterize the sequence from the drawings in the "best" pile to the drawings in the "worst" pile:

a) In the number of differentiated features: the number of forms representing recognizable differentiated features in the "best" piles

was larger than the number of such forms in other piles; progressively, the number of clearly differentiated "knowns" lessened in the second and third piles, and in the fourth, no differentiated forms appeared at all.

b) In the recognizability of the primary figure: the figure was immediately recognizable in the drawings in the "best" pile for each of the three subjects drawn; the figure became progressively less recognizable in the second and third pile, and in the fourth, no figure appeared at all. The recognizability of the primary figure depended on an integration of its sub-features.

Although in most drawings the differentiated forms appeared within the primary figure, in a few, one or more recognizable forms would appear in the background.

On the basis of these observations, we assumed that preschool teachers could readily perform two measures:

a) A rating of drawings on a five-point scale for "level of ability in drawing recognizable forms"

b) A counting of "the number of concepts" (differentiated "knowns") appearing in the primary figure for one score, a counting of "the number of concepts" appearing in the background for a second score, and a summation of the two for a third score on "the number of concepts in drawing figure and ground."

Granted these simple measures, we assumed teachers might be able to diagnose the level at which a child was performing in a given drawing, and could obtain cues as to the next efforts the child might be supported in making to bring his accomplishment to a higher level as he continued in his drawing activity.

2) Development of assessment and scoring procedures for art teachers: The development of the assessment and scoring procedures for the art teachers was based on 168 drawings made by 56 randomly selected children included in the Second Preliminary Sample. These drawings were used by six art teachers in developing criteria for assessment and scoring the level of cognitive performance in drawings, and the level of artistic performance in drawings. This developmental activity went through three parallel stages for the two thrusts.

In the first stage, we gave two art teachers, experienced with the art of young children, the 56 drawings of man. Working independently, they each arranged the drawings in four piles, the first pile of the "best" drawings, the fourth pile of the "worst" drawings, and the two intervening piles for the implied intermediate positions. The two teachers then repeated the process for the 56 drawings of house and the 56 drawings of TV(radio).

The mean interrater reliability between the two art teachers on the three tasks was .81.

One of these two teachers, here labeled the First Art Teacher, was then asked to carry through a process aimed at developing a rating scale for evaluating the level of cognitive performance, while the second teacher, labeled the Second Art Teacher, was asked to carry through a similar process aimed at developing a rating scale for evaluating the level of artistic performance.

The First Art Teacher was asked to look again at the four piles of drawings he had made of each of the three subjects (man, house, TV or radio), to compare the piles, and to enumerate the criteria (categories) that differentiated among the piles, considering primarily the cognitive aspects, and ignoring or not considering the artistic aspects of the drawings. We defined the cognitive aspects of a drawing as those which refer to what the child appeared to know of the object which had been made the "subject" for drawing. After ample discussion for orientation to the intent of the definition, and a reshuffling of the drawings from their four piles for each test item into an undifferentiated stack of drawings for each test item, the First Art Teacher was then asked to sort the drawings again into four piles for each test item on the basis of the cognitive dimension. Out of this effort, this teacher enumerated, listed and then defined the criteria which he saw himself to be using in his sorting of the four piles, supplying, at the same time, an appropriate scoring for the gradations of each criterion. This because the First Plan for assessment and scoring of drawings for levels of cognitive performance.

By a similar procedure, the Second Art Teacher produced the First Plan for assessment and scoring of drawings for levels of artistic performance. We defined the artistic aspects of drawing as th se which refer to the way in which a child went about the act of makin, the drawing, and what this way revealed of the experience the child was undergoing as he was relating to objects in his world through the drawing act.

A researcher then took the plans of assessment and scoring as provided by each of the two teachers and, in the presence of the teacher who was author of the given plan, tried to carry out the sorting of the reshuffled drawings as the plans prescribed. This led to further clarifications of the language needed to convey, in writing, what the author's intent had been. These revised editions of the First Plans then became the basis for the second stage of development.

In the second stage, two additional art teachers were engaged to continue the development of the plans, the Third Art Teacher working on the cognitive test and the Fourth Art Teacher working independently on the artistic test. As before, each of these teachers sorted the drawings into four piles using his own way of judging drawings. This

provided an initial orientation to the range and kind of drawings with which they were dealing. The definition of "cognitive" (or "artistic") was then introduced and discussed. At this point, the revised First Plan for assessment and scoring of cognitive performance was given to the Third Art Teacher, and the revised First Plan for assessment and scoring of artistic performance was given to the Fourth Art Teacher, with instructions to both to use these plans in sorting the reshuffled stacks into four piles according to the measure being applied, i.e., cognitive or artistic. The Third and Fourth Art Teachers were invited to delete, add, or revise the specifications of the First Plans in order to make them maximally useful, anticipating the eventual need to have plans which could be readily followed by art teachers when working from written instructions to rate, on the one hand, cognitive performance and to rate, on the other hand, artistic performance in preschool children's drawings.

As it turned out, the Third and Fourth Art Teachers did not delete any of the criteria in the First Plans; they added criteria, and differentiated to a further degree of detail some of the specifications in the First Plans. These products were then called the Second Plans of assessment and scoring.

We were then ready for the third stage which involved two further art teachers, using again the procedures which had been followed in the second stage. This activity resulted in quite minor changes. We concluded we had reached levels of definition, communication, and scoring which would make the plans feasible for general use in assessing levels of cognitive performance and levels of artistic performance in preschool children's drawings. The results are presented in the ensuing section of this chapter under the headings of "Level of Cognitive Performance in Drawing," and "Level of Artistic Performance in Drawing."

E. Scoring Procedure

The following six newly devised measurements were used in addition to the already available Harris Draw-a-Man Test for IQ:

1) "Level of drawing recognizable forms"

2) "Number of concepts in drawing figure and ground"

3) "Level of cognitive performance in drawings"

4) "Level of artistic performance in drawings"

5) "Number of concepts in words for subject and setting"

6) "Number of duplicate concepts, i.e., in both drawing and words"

The evaluation and scoring of the first two measures were done by preschool teachers; the evaluation and scoring of the third and fourth were done by art teachers; the scoring of the last two measures was done by research assistants.

The following describes the scoring plan for each of the newly devised measures:

1) Level of drawing recognizable forms: Four of the test drawings (man, tree, house, TV(radio)) were each rated on a five-point scale for level of ability to draw recognizable forms:

"0" for no dr undertaken

"1" for a scribble apparently done simply as visual-motor-sensory play

"2" for a scribble showing the effort of the child to make a form of some kind, though the subject intended is not recognizable

"3" for a form recognizable by the teacher when the teacher knows what the child is trying to draw, but not otherwise

"4" for a form clear enough and complete enough in its depiction of a given subject to be recognized by an outsider as a drawing of that subject.

The rating was made once in relation to the drawing of the primary figure, and once in relation to the drawing of the ground for the primary figure, netting two scores for each drawing. Preschool teachers did the assessment and scoring, accepting their emphasis to be on cognitive aspects of drawing. No special background of the teachers in children's art, art education, or the esthetics of art was assumed necessary.

2) Number of concepts in drawings: Each of the same four test drawings was also scored for the number of concepts (identifiable "knowns") appearing within them (e.g., for man--body, arms, legs, head, eyes, nose, etc.):

"0" for no drawing undertaken

"1" for each class of recognizable features entered in the drawing

Three such scores were made for each drawing, one for features within the primary figure, one for features in the background of the primary figure, and one, a sum of the previous two. The assessment and scoring was done by preschool teachers, assuming no special background of the teachers in children's art, art education or esthetics of art.

3) Level of cognitive performance in drawings: For each of the five test drawings (man, tree, house, TV (or radio) and combination of man plus house plus tree), an additional cognitive score was provided by an art educator, experienced in drawings of preschool children. Each child's drawing was scored on an eight-point scale as follows:

"0" for no drawing undertaken

"1" for no recognizable subject or features

"2" for a basic shape provided for the primary figure only

"3" for one or two features within the primary figure, recognizable only if subject of drawing is known

"4" for integration of three or four features into a clearly recognizable figure, plus some indication of effort to provide a setting for the figure to show better awareness of the location in which it actually occurs (e.g., TV set shown not on a lawn but inside a room), or an indication of the grounding of a figure (e.g., house drawn with a base line, indicating location on earth)

"5" for a clearly recognizable primary figure, not merely outlined but filled in with internal (five recognizable) features; also a recognizable figure in the background; quite good proportion in size between the recognizable figures; better setting provided for most of the figures; better grounding in placement for most figures

"6" for most major features within the primary figure and one or two features in the background; the primary figure and the background forms making a recognizable interrelated whole; proportion in size between the forms as well as features good; setting provided for all figures; good grounding in placement of all figures; attempt to draw in perspective (to show a better awareness of the visual properties of objects in receding space when seen from a given point of view)

"7" for most major features within the primary figure as well as within the background; full integration of figures and features into a clearly recognizable whole; very good proportion in size between all the forms and features; setting provided for all figures; full grounding in placement for all figures; perspective shown quite good; "shadowing" (to show a better awareness of the visual properties of objects as affected by light)

4) Level of artistic performance in drawings: For the five test drawings (man, tree, house, TV(radio), combination), "artistic scores" were provided in addition to the "cognitive scores" outlined above. "Artistic scores" were to indicate quality of drawing taken as a medium in itself and as a means of revealing the experience the child was undergoing as he was relating to objects in his world through the drawing act.

The scoring was done by a second art educator who was also richly experienced in children's art. Each of the five test drawings was scored by a rating based on an eight-point scale having the following descriptors:

"0" for no drawing undertaken

"1" for no pictorial content; a scribble with no control; paper almost empty

"2" for a little pictorial content; a scribble with some control; several shapes, perhaps, but unrelated; three quarters or so of the paper empty

"3" for one figure drawn, all alone; mainly in outline; quite stereotyped; half or so of the paper empty

"4" for one or more "objects" or shapes; showing some of either texture, shading, or line variation; forms somewhat stereotyped; no evident intent to include background or foreground even though the subject might call for it; some of the paper still empty

"5" for two or more "objects" or shapes; showing some of each of texture, shading, line variation and decoration; forms somewhat original; usually some indication of background and/or foreground where the subject calls for it; most all of the paper used; spacial balance adequate

"6" for several "objects" or shapes; showing a great deal of texture, shading, line variation, and decoration; some perspective may be evident; forms appear quite original and fresh; usually a lot of background and foreground included where the subject calls for it; all of paper used; good spacial balance

"7" for several "objects" or shapes; showing a great deal of texture, shading, line variation and decoration; perspective used where "natural" for the subject; forms are very original and fresh; background and foreground are well filled out where the subject calls for it; all of the paper used; exceptional spacial balance

5) Number of concepts in words for subject and setting: This measure provides for concepts in words, a parallel measure to that already described for number of concepts in drawings. The scores are derived from the written records of the words used to name features of the four test subjects (man, tree, house, TV(radio)).

"0" for no word used by the child

"1" for each feature named. Three such scores were made for each test subject, i.e., for concepts pertaining to the primary figure, for concepts pertaining to the background of the primary figure, and for the sum of the previous two. The scoring was done by research assistants.

6) Number of duplicate concepts, i.e., in both drawing and words: A score on "duplicate concepts" was provided by counting the number of concepts appearing in a child's drawing of a given subject which also appeared in the words he used to describe the subject (or its setting).

"0" for no duplicate concept

"1" for each such duplicate concept

The scoring was done by research assistants.

7) IQ: The drawing of a man was scored for IQ by psychologists using the Harris-Goodenough scoring plan.

When a given test item was scored on a given measure by the art teachers, preschool teachers, and research assistants, the scorer received that item (e.g., all drawings of house) in randomized order, the drawings having been shuffled to obscure grade level, location of school, age, sex, or name of the child.

F. Reliability of the Test Items

The reliability of the test items was checked by test-retest of three of the test items used in making drawings, with a 10-12 day separation of the first and second administrations, and by test-retest of two of the test items used in getting verbal descriptions, with a 10-12 day separation of the first and second administrations.

1) Test-retest of the drawing items: In order to test the reliability of the drawing items chosen for this study, the 56 children (28 Israeli, 28 American) included in the Second Preliminary Sample were asked to draw again the three subjects (man, house, and TV or radio) they had previously drawn. This was done 10 to 12 days after their first drawing of these subjects; the procedures were the same for both occasions. Each occasion produced 168 drawings.

The reliability for the test-retest of the drawing items was as follows:

TABLE 6

Reliability for Test-Retest of the Drawing Items

Subject Drawn		No. cases
Man	.94	56
House	.90	56
TV set	.91	28
Radio set	.93	28

The high reliability of .94 for the test-retest drawings of "man" in our study is very similar to those reported in other publications. In her initial study, Florence Goodenough reported (in Measurements of Intelligence by Drawings, New York: Harcourt, Brace & World, 1926) a test-retest reliability (with one day separation between tests) of .937 on 194 drawings of first grade children. With a sample of 2,600 children in the first through the eighth grades in Western City, F. Smith (in "What the Goodenough Test Measures," Psychological Bulletin, 1957, 34, 760-761 (abstract)) reported test-retest correlations ranging between .91 and .96

What is new, interesting and important in this study is to find that preschool disadvantaged children attain very high test-retest reliability, not only on the subject of man but on other subjects as well. The fact that these children can draw any of these subjects with consistent standards for different occasions infers that they have already stabilized a sense of process for drawing.

2) Test-retest of the verbal items: From the first testing of the Second Preliminary Sample, we had 56 records of verbal expression about the subject man, and 25 records of verbal expression about the subject TV (from the American children). The retesting of these children on verbal expression was done the day following the retesting of the drawings; this meant 10-12 days after the first testing of verbal expression. The procedures followed on the second occasion of testing were the same as those followed on the first occasion. Each occasion produced 81 verbal records.

The reliability for the test-retest of the verbal items was as follows:

TABLE 7

Reliability for Test-Retest of the Verbal Items

Verbal expression about subjects		No. cases
Man	.91	56
TV set	.89	25

The test-retest reliability of the verbal items was very high, and as high as the test-retest reliability of the drawing items. This infers that preschool disadvantaged children have stabilized their verbal behavior as well as their drawing behavior. This is an observation which will receive further testing and qualification in connection with later, more extensive data.

G. Reliability of the Assessment and Scoring Procedures

1) Rater reliability of the Israeli teachers: From the randomly selected 28 disadvantaged prekindergarten and kindergarten children included in the Second Preliminary Israeli Sample, 28 drawings were available on each of the three test items, making a total of 84 drawings in all. Each of these 84 drawings was reproduced (Xeroxed) 32 times. The 32 sets of 84 drawings were then given, one set each, to 32 Israeli preschool teachers who scored the drawings in two different ways during two different sessions.

During the first session, each of the 32 teachers was asked to rate the level of recognizability of form, first in the 28 drawings of "man," next in the 28 drawings of "house," and last in the 28 drawings of "radio." More specifically, using a scale from zero through four, the teacher was asked to rate each drawing for the recognizability of form in the primary figure, taken alone, and then the recognizability of forms in the background of the primary figure, taken alone. (For the scale, see in this chapter, under "Scoring Procedure," sub-head "Level of drawing recognizable form.")

Next day, during the second session, the same 84 drawings were given to the same teachers for a second kind of test. A check sheet was provided on which were listed the names of the features of each of the test items which might appear in the drawings made of those test items by preschool children. The teachers were then asked to check off the features (concepts) included by a given child in his drawing, proceeding first to check for the features appearing within the primary figure, and second to check for the features appearing in the background. The number of concepts thus checked in each of the figure and ground was then counted, recorded for each, and also summed as a total score for "number of concepts in figure and ground." This procedure was followed for each of the three test drawings.

Two weeks later, the same 84 drawings were given to the same 32 teachers who were asked to repeat the procedures, using one session each for each test, as they had previously done.

Rater reliability for the two tests rated by Israeli teachers was as follows:

TABLE 8

Rater Reliability for Two Tests Rated
by Israeli Preschool Teachers

Test and Test Items	Rating of Figure	Rating of Background
Level of drawing recognizable forms		
Man	.94	.90
House	.90	.88
Radio	.91	.90
Number of concepts expressed in drawing		
Man	.99	.95
House	.93	.90
Radio	.92	.90

Significantly high rater reliability was found among the Israeli teachers in both tests: a mean of .92 for the three drawings on the test of recognizability of form in the figure, and a mean of .89 for the three drawings on the recognizability of form in the background; a mean of .95 on the test of number of concepts expressed in the figure of the three drawings, and a mean of .92 on the test of the number of concepts expressed in the backgrounds of the three drawings.

2) Rater reliability of the American teachers: To the 84 drawings which had been rated by the Israeli teachers, were added 28 drawings of "tree," available from the 28 randomly selected prekindergarten and kindergarten children included in the Second Preliminary American Sample.

The total of 112 drawings (twenty-eight drawings of each subject: man, house, radio and tree) were given to 20 American (prekindergarten and kindergarten) teachers who proceeded as had the Israeli teachers.

Rater reliability for the two tests rated by American teachers was as follows:

TABLE 9

Rater Reliability for Two Tests Rated
by American Preschool Teachers

Test and Test Items	Rating of Figure	Rating of Background
Level of drawing recognizable forms		
Man	.97	.94
House	.94	.90
Radio	.92	.90
Tree	.92	.81
Number of concepts expressed in drawing		
Man	.99	.97
House	.98	.95
Radio	.95	.93
Tree	.95	.90

The mean interrater reliability on the number of concepts expressed in the figure in the four drawings for American teachers was .95; for Israeli teachers, it was .94. The mean interrater reliability on the number of concepts expressed in the backgrounds of the four drawings for American teachers was .94; for Israeli teachers, it was .92.

We interpret the high rater and interrater reliability among the American as well as Israeli preschool teachers to be a result of two main factors: 1) the level of stability in the drawing of preschool disadvantaged children, and 2) the utility of the plans for assessment and scoring.

While drawing is an art form meriting specialized attention at all levels, children's and otherwise, it is being approached by preschool disadvantaged children at a level which lends itself to judgments which preschool teachers can make quite effectively, provided the teachers are aided by a plan they can use and can gain confidence in their evaluational abilities.

We are assuming that as a child draws, he is not only doing something of immediate intrinsic value to himself, but he is also offering to others a message as to what he knows and is able to do; he is saying something to others, which when accepted as a communication, can become an avenue of exchange and mutual interest between "significant others" (including the teacher) and himself. A child can communicate

"house" by drawing it. Houses are shared by adults and children, and a drawing of a house by a child is a form of his saying he is coming to learn what is shared between himself and others; it is a way of saying he knows a mutual belonging. Drawing, taken as a form of communicating knowings and doings, is therefore a suitable ground on which teachers of disadvantaged preschool children can approach the drawings they evaluate. There should be no basic discontinuity between what the child is trying to communicate and the understanding of the communication message by the teacher, using simple plans provided for evaluating the drawings in the framework of communication.

Preschool teachers learned quickly to use, and are reliable in their use of, a rating scale for judging the level a child reaches in drawing a recognizable figure of a given subject; they can readily and reliably count the number of concepts which a child includes in his drawing of a given subject and its setting. These are probably the two major "messages" a child tries to communicate: his differentiated knowings about a given subject, and how he puts together his differentiated knowings into an integrated figure meaningful to him and hopefully to others.

3) Rater reliability for the art teachers on measures of cognitive performance: A total of 100 drawings (25 for each subject: man, house, radio, and tree) was given to four art teachers (experienced in the drawings of young children) who on two different occasions, two weeks apart, scored each drawing on an eight-point scale as described in this chapter under "Scoring Procedure," sub-heading "Level of cognitive performance in drawing."

Rater and interrater reliabilities for the four art teachers on the level of cognitive performance in drawing were as follows:

TABLE 10

Rater and Interrater Reliabilities for the Art Teachers on the Level of Cognitive Performance in Drawing

Test Item	Rater Reliability	Interrater Reliability
Man	.99	.94
House	.97	.93
Radio	.98	.96
Tree	.98	.93

Significantly high rater reliability (mean of .98) and high interrater reliability (mean of .94) was found among the four art teachers on the test for level of cognitive performance in drawing.

4) Rater reliability for the art teachers on measures of artistic performance: The same 100 drawings (25 for each subject: man, house, radio and tree) were given to four different art teachers (also richly experienced in young children's art) who, on two different occasions, two weeks apart, scored each drawing on an eight-point scale, described in this chapter under "Scoring Procedure," sub-heading "Level of artistic performance in drawing."

Rater and interrater reliabilities for the four art teachers on the level of artistic performance in drawing were as follows:

TABLE 11

Rater and Interrater Reliabilities for the Art Teachers on the Level of Artistic Performance in Drawing

Test Item	Rater Reliability	Interrater Reliability
Man	.98	.91
House	.96	.89
Radio	.98	.92
Tree	.97	.90

Significantly high rater reliability (mean of .97) and high interrater reliability (mean of .90) was found among the four art teachers on the test for level of artistic performance in drawing.

The highly significant rater and interrater reliability of the preschool teachers as well as the art teachers in their assessment and scoring of the drawing of the subject man, found in our study, is similar to what was found in other studies: for example, McHugh[1] used a test-retest procedure on 83 drawings of man made by kindergarten children. The drawings were scored by McHugh and an undergraduate student. He reports rater and interrater reliability of .91. Williams[2] used five examiners independently to score the drawings of man by 100 children of ages 6-8 years, obtaining four interscorer correlations

[1]G. McHugh, "Relationship Between Goodenough Draw-a-Man Intelligence Test and the Stanford-Binet Test," Journal of Educational Psychology, 1955, 36, 119-124.

[2]J. H. Williams, "Validity and Reliability of the Goodenough Intelligence Test," School & Soc., 1945, 41, 653-656.

ranging from .80 to .96. Pikulski[3] reported that when scores obtained by him (Ph.D. psychologist) on drawings of man were correlated with those obtained by two independent scorers, the correlations all exceeded .90.

In our study, the preschool teachers as well as the art teachers assessed and scored drawings not only of the subject man, but also on other subjects (house, tree, TV set, radio set and a combination drawing of man plus house plus tree). The rater reliability as well as interrater reliability for their assessment and scoring of the drawings of all other subjects was as high as that for the subject man.

H. Validity of the Tests

We are concerned, here, with the validity of the six tests devised for this study. Basic information about these tests is summarized as follows:

Areas of performance	Name of the test	No. of test items	Assessed and scored by
Cognitive drawing capability	Level of drawing recognizable figure	4	preschool teachers
Cognitive drawing capability	Number of concepts in drawing figure and ground	4	preschool teachers
Cognitive drawing capability	Level of cognitive performance in drawing	5	art teachers
Artistic drawing capability	Level of artistic performance in drawing	5	art teachers
Cognitive verbal capability	Number of concepts in words for subject and setting	4	research assistants
Combination of drawing and verbal	Number of duplicate concepts in drawing and words	4	research assistants

[3]J. J. Pikulski, "The Interscorer Reliability of Three Systems for Scoring Figure Drawings." Unpublished paper, Reading Study Center, University of Delaware, 1971.

In developing these tests, validity was a concern in all stages. We began with a theory of what cognitive development entails as an orderly and finite progression of conditions and operations: Chapter II, Sec. A. We amplified the meaning of that progression as relevant to affective (artistic) development: Chapter V, Sec. B. We carefully constructed tests which contained within them the operational definitions by which cognitive development, as defined, could be recognized and assessed in drawings and in words; we also carefully constructed a test of artistic development in drawings to operationalize the specifics of artistic development as defined in reference to drawings. We have reported on these test constructions within the present chapter.

Insofar as these efforts succeed, they provide an internal validity for the tests, i.e., the tests do what they were intended to do. What we report now is data on external valditiy, i.e., on the relation of our test results to the results obtained on (1) the Harris-Goodenough Draw-a-Man Test, and on (2) age.

1) Validity by reference to the Harris Draw-a-Man Test: Since the Harris Draw-a-Man Test uses the same medium of expression (drawing) as four of our tests, brief reference to the experience of validating the Harris Test by outside criteria may be helpful as orientation.

Although investigation of children's drawings can be traced back to the mid 1880's and perhaps beyond, it was the work of Florence Goodenough in 1926 that led to an objective, quantified system for evaluating the intellectual maturity and ability of children through their drawings of the human figure. The scoring system Goodenough devised was based on normative data obtained in the early 1920's. It was validated against the Stanford-Binet IQ Test; Goodenough[4] reports a correlation of .64, based on a group of 334 children, aged 4 to 10 years.

Goodenough's scoring plan was widely used without change from 1923 to 1963 when Harris[5] revised the scale. Commenting that Goodenough's system was so well constructed that little room was left for change or improvement, Harris nonetheless increased the number of scoring items from 51 to 73. He reported very high correlations between his revised version and the original (.91 to .97).

Harris (1963) summarized nine validating studies which, like the original validation procedure, was correlated with the Stanford-Binet Test with results ranging from .92 to .26. Used in many countries for evaluation of mental ability and mental maturity of young children through their drawing of the human figure, the Harris revision seems appropriate for us to use in our external validation procedure.

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[4] F. Goodenough, Measurements of Intelligence by Drawings, New York: Harcourt, Brace & World, 1926.

[5] D. B. Harris, Children's Drawings as Measures of Intellectual Maturity, New York: Harcourt, Brace & World, 1963.

Giving our attention first to the three tests of cognitive ability and their correlation with the Harris-Goodenough Draw-a-Man Test, we obtained the following:

TABLE 12

Correlations: Harris Draw-a-Man (IQ) Test vs. Tests of Cognitive Ability in Drawing; Total Pool of Cases

Test Items	Man	Tree	House	TV (radio)	Comb.	Mean Correlation
Level of drawing a recognizable figure	.66	.39	.46	.36		.47
No. of concepts in drawing figure and ground	.64	.36	.42	.36		.45
Level of cognitive performance in drawing	.64	.37	.42	.37	.45	.46

All test items of all three tests devised for this study to measure cognitive drawing capability in preschool children are significantly correlated (i.e., above .32, floor for the .001 level) with IQ as measured by the Harris Draw-a-Man Test. The tests work to make assessments in line with the assessments made by the Harris Draw-a-Man Test. Cognitive ability is what all the tests undertake to sample, all using drawing as the medium of the child's expression.

Looking at the correlations on test item "man" in the three tests, they are especially high in their relation to IQ: "Level of drawing recognizable form" (.66), "Number of concepts in drawing figure and ground" (.64), and "Level of cognitive development in drawing (.64). The level of correlation suggests that when preschool teachers use our methods of assessment and scoring the drawing of man (i.e., rating for "level of recognizable form," or counting for "the number of concepts" appearing in the drawings) they can come up with results which, for a group of children, would usefully approximate what would be gotten if the drawings were to be scored by psychologists on the Harris Draw-a-Man Test. Or, art educators, experienced in children's drawings and using the scale for "level of cognitive performance," can gain group

results usefully approximating what would be obtained by use of the Harris schedule by psychologists.

Using test items other than "man," correlations with IQ on the three "cognitive drawing content" tests run between .36 and .46, suggesting that a significant relation to IQ still obtains on these measures even though the content in them is not "man." This suggests a broadening of thought about the possibilities of using drawings generally (not restricted to the subject matter of "man" alone) to detect cognitive development in children, and an encouragement of preschool teachers and art educators to believe they can rely on their own procedures to give them good guidance for teaching when using drawing to promote cognitive development.

Not to be overlooked is that validity remains substantial even though the forms given to the tests are tailored to the specific needs and possibilities of each class of user. For example, the tests for use by the preschool teachers are fitted to the situation in which the preschool teachers work; they provide the kind of information which preschool teachers need in the kind of decisions they have to make as they work, moment by moment, to help specific children do their specific drawings so that the children can each be led to the next steps which are developmental for them in those specific drawings. The "logic" of the test is the "logic," also, of the teaching. While the tests can be used in the usual way to get results on groups if desired, they can also help the teacher to carry out his teaching function, child by child, and drawing by drawing.

Likewise the tests specifically made for use by art teachers are of such a form that they give information of the specific kind such teachers can use in their activity as teachers. So also, for the Harris Draw-a-Man Test, where the psychologists have their particular functions to perform in relating their kind of data to decisions of importance to them in understanding mental development as relevant to school success.

Implicit in the validity data is the realization that the capacities of the children are a common denominator for all three classes of users, and the inference that, should the users collaborate on the common target of developing children through drawing, they could helpfully supplement each other in a major thrust to achieve that common end.

Turning attention now to the correlation of the test for level of artistic performance in drawing with the Harris Test, we have the following:

TABLE 13

Correlations: Harris Draw-a-Man (IQ) Test
vs. Level of Artistic Performance in Drawing;
Total Pool of Cases

Test	Harris Draw-a-Man IQ					
Test Items	Man	Tree	House	TV (radio)	Comb.	Mean Correlation
Level of artistic performance in drawing	.48	.29	.31	.25	.25	.32
Level of significance	.001	.01	.01	.05	.05	.001

On the "level of artistic performance," a significant relation to IQ at the .001 level is obtained in the mean correlation. Correlations by test item vary, that for "man" at .48 being much higher than that for "tree" at .29, for "house" at .31, for "TV(radio)" at .25, and for "combination" at .25. As mean scores on "number of concepts in drawings" will show (Table 20), the children could put about three times more forms into their drawing of "man" than they could put into their drawing of any other item. This meant that drawings of "man" offered more opportunity for the children to display artistic qualities in what they drew. Without a minimum of cognitive content in preschool children's drawings, artistic performance has no way to show. Where cognitive content shows in some abundance, artistic performance tends to show, too, as the correlation of .48 between IQ and artistic performance on "man" indicates.

On the tests of verbal performance, we found the following correlations with the Harris Test:

TABLE 14

Correlations: Harris Draw-a-Man (IQ) Test
vs. Two Tests of Verbal Ability;
Total Pool of Cases

Test	Harris Draw-a-Man IQ				
Test Items	Man	Tree	House	TV (radio)	Mean Correlation
Number of concepts in words for subject & setting	.19	.13	-.02	.10	.11
Level of significance	N.S.	N.S.	N.S.	N.S.	N.S.
Number of duplicate concepts in drawing and words	.57	.24	.32	.13	.32
Level of significance	.001	.05	.001	N.S.	.001

The test of the "number of concepts in words for subject and setting" does not show significant correlation with the Harris Test. This implies that the test is not valid for predicting later school success. This finding is borne out by other non-significant correlations appearing between this verbal test of cognitive ability and the tests of cognitive ability in the medium of drawing. It appears from the above, and other data, that the American children do not develop verbally in ways associated with their development visually, as reflected in drawings. Having internal validity, the test of the "number of concepts in words" tells us something about the children when external validity does not work out.

On "duplicate concepts," the story is not the same. The correlations with the Harris Test become significant in the mean, and for three of the four test items. The correlation is particularly high for the subject, "man." The story is not the same as on the "number of concepts in words" because the game is not the same. On this test, drawing concepts are matched with verbal concepts; the children who have a good ability in dual-conceptualization are good prospects for later school success, as the Harris predicts. The words are associated with drawing capability and, as elsewhere reported, drawing capability is developmentally related to the Harris prediction. The test therefore has a significant degree of external validity as the Harris Test supplies it.

In summary, the correlations with the Harris Draw-a-Man Test for IQ are significant, positive and supportive for each of the three tests of cognitive ability in drawing, for the test of artistic ability in drawing, and for the test of duplicate concepts wherein drawing concepts are paralleled with verbal concepts; the correlations with the Harris Draw-a-Man Test do not support the test of the number of concepts in words.

These findings take "external validation" to be "that which predicts success in school." (The Harris Test is used because it provides such prediction.) In sum, our finding is that our drawing tests do so predict; our verbal test does not. All the tests, having known operational meanings, have internal validity on their own grounds. This being so, the gap between predictability from drawing and predictability from words in reference to the Harris Test as a predictor of school success is not an invalidation of the verbal test for what it operationally reveals; what the gap shows is that children can and do have differential developmental patterns as between their visually organized world, as revealed in their drawings, and their verbally organized world--success in school being predictably better when the two modes of development are synchronized.

2) Validity by reference to age (in months): Whereas the Harris Test is a predictor with reference to later school success, age is taken as a predictor of maturation. As children process the incremental experiences brought by the passing of the months, they have the tendency and need to organize their learnings into more advanced forms. The six tests were constructed with careful attention to progression from less developed to more developed forms. It is therefore logical to use, as an external criterion of validity, the data on age in months.

Using this criterion, the following correlations were found with scores on the six tests:

TABLE 15

Correlations: Age (in months) vs. the Six Tests; Total Pool of Cases

Tests	Age in Months					
Test Items	Man	Tree	House	TV (radio)	Comb.	Mean Correlation
Level of drawing a recognizable figure	.47	.41	.48	.47		.46
Number of concepts in drawing figure and ground	.39	.34	.51	.53		.44
Level of cognitive performance in drawing	.37	.39	.42	.48	.53	.45
Level of artistic performance in drawing	.24	.40	.22	.24	.42	.30
Number of concepts in words for subject & setting	.24	.20	.11	.03		.15
Number of duplicate concepts in drawing and words	.31	.25	.38	.22		.29
Level of significance	.20 for .05 level; .26 for .01; .32 for .001					

For the first three tests, all on cognitive ability in drawing, the correlations with age are significant for all test items on each of the three tests at the .001 level of significance. The correlations tend to be consistent across test items, suggesting that differences otherwise observed in relation to test items are likely to be a function of other factors than age. These cognitive drawing tests are well validated in respect to maturation, insofar as age represents it.

On the test of level of artistic performance in drawing, the correlations with age are more sensitive to test items differences; the mean correlation is at the .01 level, all test items reaching that level

(two at the .001 level). The test of artistic ability less dramatically, but yet substantially, joins the tests of cognitive ability in drawing as validated in respect to maturation, in so far as age represents it.

On the test of verbal ability (as related to test items also used as subjects for drawings), the correlations with age drop drmatically, the mean being .15 and not significant. This is part of the repeated story of disassociation between development in verbal expression and development generally, our subsequent study revealing this to be due primarily to the mind set of the American children as different from the Israeli children. The verbal test is therefore not usable as a predictor of maturation, as age represents it, and is not valid for that purpose.

On the test of duplicate concepts where concepts in drawing are mated to concepts in words, the correlations with age rise again, coming to a mean of .29 (.01 level of significance) which is very close to halfway between the mean of the correlation for the number of concepts in words (.15) and the mean of the correlation for the number of concepts in drawing (.44). With the help of drawing, words can have predictive value in rematuration, as age represents it; otherwise word concepts did not turn out to be predictive, taken alone.

In summary, what proved to be "valid" about the six tests when measured against a predictor of school success proved again to be "valid" when measured against a predictor of maturation. Tests based on drawings are validly relevant to "development" as represented by the two external criteria of the Harris IQ and age in months. The fact that word concepts did not turn out to be validly relevant to these criteria, while drawings did, introduces a potent point for the consideration of preschool programmers: if drawing is relevant to development of preschool children, and words may or may not be (depending on the experience of the children), what advantage can be taken of drawing as a stabilizing medium for development while words are catching up? How interlock the two media for maximum school success and maturity?

I. Statistical Operations

To test the hypotheses of the study, we used the following statistical procedures:

Correlations: (a) to relate the children's performance on one kind of test and test item to their performance on other kinds of tests and test items to gain insight into the interrelationships among cognitive development in drawing, artistic development in drawing, cognitive development in words, and cognitive development in a combination of drawing and words as these enter into the development of preschool disadvantaged children; also (b) to relate the performance

of preschool teachers to the performance of art teachers in the assessment and scoring of drawings in order to determine the relative capability of preschool teachers to do essential evaluations of the drawings of preschool disadvantaged children as used in programs of teaching for cognitive development.

Means: (a) to compare the two national groups with respect to their levels of performance on the tests as revealed by their means and t-tests in order to gain insight into similarities and differences that might obtain because of similarities and differences in cultural contexts of the two national groups; and (b) to refine the comparison by "holding constant" the factors of age and IQ in a one-way Analysis of Covariance in order to leave in less ambiguous view the similarities and differences in the children's performance that might be due to similarities and differences in cultural contexts of the two national groups.

CHAPTER V
HYPOTHESES: DERIVATION, DATA AND INTERPRETATION

Pursuant to the five leading questions stated in Chapter III, hypotheses for testing were generated under five headings, i.e., hypotheses concerned with 1) generalized drawing capability, 2) the relation of cognitive and artistic drawing abilities, 3) the relation of drawing capability and verbal capability, 4) the similarity of the two national groups, and 5) the ability of the preschool teachers to make essential evaluations of children's drawings.

For each of these areas of concern, we first introduce the assumptions and rationale by which we arrived at hypotheses for test; we then state the hypotheses for test, introduce the related data, and interpret the findings. The chapter closes with a summary interpretation.

A. Concerning the Generalized Drawing Capability of Preschool Disadvantaged Children

1) Assumptions leading to hypotheses: We assume that across individuals, preschool disadvantaged children will exhibit wide variability in capacities to draw, but that across subjects drawn, any given individual child, as of a given time in his development, will tend toward consistency in the level of drawing ability he brings to his drawing of any subject, i.e., he exhibits a "generalized drawing capability."

Because of past experience he may have had in his drawing of given items, he may be able to enter more concepts in his drawing of those items than he is able to enter into his first drawings of new items, but he will try to draw new items at the levels of ability and satisfaction he has been able to achieve in his "most successful" work. He has a standard which he seeks to attain; in this way, he is enabled to develop through additional effort.

We take the phenomenon of generalized drawing capability to be an indication that drawing is a potential growth vehicle for children. We take children to be implicitly involved in undertaking to grow, and endowed, by necessity, to pursue that growth through exercising sensuous differentiations of forms in their environment relative to their needs, and through exercising their capabilities to act with relation to those forms for their own growth and development. We take drawing to be a "natural" process for growth in the sense that it promotes sensuous differentiation of forms in the environment, and action on the part of

the child to create forms relative to that environment. Children, therefore, find satisfaction in drawing as offering exercise of their essential and "natural" capability for growth. Evidence of "generalized drawing capability" is evidence of this condition.

In defining "cognitive development," Chapter II, we operationalized a general conception of growth to which we can now give more specific meaning in reference to growing through drawing. There, the operations in reference to cognitive development were summarized in relation to the level a child reached in (1) becoming involved, (2) differentiating, (3) self-owning, (4) expressing and acting, (5) relating knowings to doings, (6) identifying what he does not know, and (7) seeking further knowings for growing. Here, we can expand and become more specific in reference to level of generalized drawing capability as the level a child reaches in:

becoming involved in the experience of drawing;

differentiating forms in his drawings and in his environment;

self-owning his knowings as he comes to exercise them in his drawings;

recognizing his knowings as offering alternatives for choice in what he may enter into his drawings;

refining his knowings by consideration of what fits well and does not fit well in his drawings;

recognizing new knowings he might be able to enter into his drawings;

sensing the connection between knowing more and having more freedom to gain what he wants from his drawing;

sensing a problem, i.e., a gap between what he wants to be able to draw and the knowledge he then has available for doing the drawing;

locating what he needs to know in order to do what he wants to do in his drawing, i.e., seeking more knowings and learning how to do his own seeking;

looking at his environment for the drawable aspects of it; addressing himself toward objects in his environment as though they might yield to his drawing of them; and

taking his drawings as means of communication with others.

These operations reflect a wider range of potential "observables" in a child's activity in drawing than our testing undertakes to identify, but our measures, in testing the tendency of children to draw

at the same level of performance across subjects they draw, will indicate whether or not the concept of "generalized drawing capability" is worth entertaining as part of a general view on the uses of drawing for generating child development.

Assuming a generalized drawing capability, we hypothesize that each measurement of the drawing ability of the children will show a significant positive correlation as among the four different subjects used for drawing: man, tree, house, TV(radio). More specifically, such correlations will show for 1) each of the measures of cognitive ability in drawing (Level of Drawing a Recognizable Figure, Number of Concepts in Drawing Figure and Ground, and Level of Cognitive Performance in Drawing), and for 2) the measure of artistic ability (Level of Artistic Performance in Drawing).

2) Hypothesis A-1: data and interpretation

Hypothesis A-1: Each test of cognitive drawing ability will show a significant positive correlation as among scores made on its varied test items.

The hypothesis is confirmed. A correlation of .32 reaches the .001 level of significance. Without exception, the correlations are well beyond .32; see Table 16.

We interpret this to be evidence that cognitive drawing ability nds to generalize across subjects drawn. This does not mean that e extent of a child's knowledge about one test item is equal to the extent of that child's knowledge about each other test item, but rather that the rank of a child among his peers in the extent of knowledge he shows in drawing one subject will tend to be rank he also holds among his peers in the knowledge he shows in his drawings of other subjects.

TABLE 16

Intercorrelations Among Test Items for Tests of Cognitive Ability in Drawing; Total Pool of Cases

Test and test items	Test items and test			
	Man	Tree	House	TV(radio)
Level of drawing a recognizable figure	Level of drawing a recognizable figure			
Man				
Tree	.53			
House	.61	.49		
TV(radio)	.55	.54	.54	
	Mean of the correlations = .54			
No. of concepts in drawing figure & ground	Number of concepts in drawing figure and ground			
Man				
Tree	.40			
House	.49	.55		
TV(radio)	.51	.46	.61	
	Mean of the correlations = .50			
Level of cognitive performance in drawing	Level of cognitive performance in drawing			
Man				
Tree	.59			
House	.75	.65		
TV(radio)	.63	.63	.68	
Combin.	.71	.62	.75	.68
	Mean of the correlations = .67			

3) Hypothesis A-2: data and interpretation

Hypothesis A-2: The test of artistic drawing ability will show a significant positive correlation as among scores made on its varied test items.

TABLE 17

Intercorrelations Among Test Items for
the Test of Level of Artistic Ability in Drawing;
Total Pool of Cases

Test items	Man	Tree	House	TV(radio)
Man				
Tree	.50			
House	.57	.50		
TV(radio)	.46	.48	.49	
Combin.	.46	.36	.48	.45

Mean of the correlations = .48

The hypothesis is confirmed. Without exception, the correlations reach and surpass .32 which is sufficient for the .001 level of significance.

We interpret this to be evidence that artistic drawing ability tends to generalize across subjects drawn.

With Hypotheses A-1 and A-2 confirmed, the more general hypothesis that the level at which a child draws one subject, compared to his peers, is the level at which he tends to draw other subjects, compared to his peers, is also confirmed.

We interpret this as evidence of "generalized drawing capability" in preschool disadvantaged children. In turn, this supports the assumption that drawing can be used to help preschool disadvantaged children develop; they will want to learn to draw new subjects at the level they have achieved in drawing subjects already familiar to them. By engaging them in drawing successive new subjects, they can be led to learn about an increasing range of objects in their environment, while learning, also, to do drawing better.

B. Concerning the Relation of Cognitive and Artistic Drawing Abilities

1) Assumptions leading to hypotheses: Heretofore, we have stated our assumptions concerning "cognitive development" and the meanings implied for "levels of cognitive ability in drawing." Here we wish to state our assumptions concerning "affective development" and the meanings then implied for "levels of artistic ability in drawing," seeing how these are related to the conceptions already offered for "cognitive development" and "levels of cognitive ability in drawing."

We take "cognitive" and "affective" to be two aspects of one phenomenon, i.e., the development of the child. The child's basic condition is that of actor-in-the-world; he has need, on the one hand, to be able

to take into account the characteristics of the environment in which he acts; he has need, on the other hand, to take into account himself as seat and source for the organization and conduct of action. Through his increasing differentiation of forms in his environment, he grows in his ability to deal with what the environment offers and requires; through his increasing differentiation of formings possible to himself, as actor, he grows in his ability to affect the environment in service to his needs as a person. Increasing differentiation of forms in the environment is emphasized when we speak of his cognitive development; increasing differentiation of formings possible in ordering action is emphasized when we speak of his affective development.

The implication of the two terms, "cognitive" and "affective," is therefore not that of the two kinds of development, each separate, independent, and competing with the other, but rather that of a dynamic by which development comes about as a child grows in his capacity to function as actor-in-the-world. The terms refer to perspectives the observer of a child can usefully use, as watching the development of a child, he can, on one occasion, concentrate his attention on what the child differentiates when facing the environment to which he needs to relate his actions, and on another occasion, on what the child differentiates in ordering himself as actor affecting the world. Measurements, differentiated for these two perspectives, are beneficial to the observer who, seeking to aid the child in his development, wishes to focus his own efforts more perceptively on junctures where intervention can be most helpful in leading the child to better deal with his environment or himself.

In respect to abilities in drawing, the cognitive aspect is that of the drawings which reflects what the children know of the world in which they are living. From that perspective, we are concerned with a drawing as revealing the properties and features of objects in the child's environment as the child has learned to note them. These objects come into the child's experience as already made and given, and the child has learning to do in coping with the world, thus composed. Measurements of this learning are then devoted to comparing the number and structure of features of those observed objects with the number and structure of correlative features the child has entered into his drawing. We are then trying to see what the child has learned of his surrounding environment as created and given.

The affective aspect of a drawing is that which reflects what the children do as actors-forming-drawings. From that perspective, we are concerned with the child's level of effort and accomplishment in organizing and effecting his action through the medium of paper and pencil, doing a drawing. We then give attention to whether a child is yet caught in scribbling or can make a form; whether he can connect the shape of a form he makes on paper to the shape of a form he remembers or then sees in his environment; whether he is limited to outlining or can also use texture effects to show surfaces; how variable his shapes have come to be; how they are situated on a page; whether he is cramped in using the space on the page or is free in using much of it;

the variability of his lines; whether he attempts to enter foreground or background; whether he has yet caught on to relativity of sizes on paper as related to the experienced or visible size of objects in the environment; whether, as actor in the world in the medium of drawing, he shows himself to be freely forming or constricted, freely imaginative or stereotyped, freely spontaneous or hampered, etc.

Drawing, even at its most rudimentary level, is an art, the general function of which is the development of the human actor, creatively forming relations which are fulfilling and fitting to his composition. Human living entails a fitting transaction between the world and oneself, both the world and oneself receiving and giving to net for the human a fulfilling life for his mode of being. Maturing depends as much on a child's learning of himself as affective agent, affecting the world, creating with it, as on a child's learning of the world as a condition of givens, created.

Measurements of affective learning are therefore devoted, in the instance of drawing, to comparing what a child does in a given drawing act with what he might be able to do at more advanced levels of using the "art." The perspective of the "affective" is the perspective of the "artistic," and hence the use of the term "artistic" in the phrase "level of artistic ability in drawing," both to honor the function of art as primarily concerned with the affective development of man, and to avoid the clinging connotations of "affective" as popularly used to refer to "the emotions" in non-operational cul de sac fashion.

From the perspectives of "cognitive" and "artistic," we therefore seek to follow and support children for what they need to be able to do, both generally and in more specific relation to abilities required for learning in school, as witness the following: Drawing invites, allows, and requires:

a) integrating: the gathering of otherwise scattered experiences, impressions and impulses into relation through their inclusion in a process of rendering a drawing of a given subject

b) differentiating: the delineation of forms in the environment or in one's own actions or products of drawing by which more inclusive integrations may be accomplished in further drawing acts

c) projecting: the visualization of what might be formed, used as guide to what is being formed during drawing; imagining

d) creating: the rendition of a product new in the environment and never before presented to the world; done by oneself and no other, and no question; one does one's own drawing.

e) self-realizing: the confrontation of oneself as source for giving order in action and creation; the acceptance of an inner involvement in producing one's drawing; the acceptance of responsibility

f) discovering: happening upon new relations while undertaking to put previous knowns together in new combinations, i.e., those required in a medium different from the medium in which the previous knowns were experienced

g) inventing: using given means in new ways to effect new sets of relations; using paper and pencil to create varied forms of effect in drawings, suited to fit varied subjects

h) observing: giving careful attention to the structure and character of forms given by the environment and produced by the observer as relevant to his actions, projections, and the environment

i) experimenting: trying alternative ways of doing, subjects for knowing, or goals for achieving; exploring

j) problem sensing and solving: discovering gaps between the desired and the given; looking for ways to achieve the needed

k) comparing: looking for fittings among forms in the environment, forms in the product of drawing, and between the two; evaluating the forms of the accomplished against the desired

l) deciding: facing alternatives and making choices; choosing what to try to show in a drawing, and how to try to show it; many possible choices are always available

m) objectifying: looking at the environment to see "the way it's really made"; looking at the product of one's own work for "what is really there"

n) generalizing: developing processes (e.g., drawing) capable of using varied contents (e.g., varied subjects) or developing concepts (e.g., house) capable of including varied cases (e.g., drawings of many kinds of "houses")

o) concentrating: focusing attention over a period of time needed to produce a drawing; the richer the drawing, the greater the satisfaction, the greater the time, the greater the concentration required

p) controlling: taking charge of the sequential process of effecting a drawing; holding to a discipline of doing until completion

q) developing: differentiating more while integrating more; including more features within one's drawing while more fully interrelating those features; experiencing the evolution of order during the development of a drawing, and the evolution of capacity to order as one becomes more capable in successive drawings

r) reasoning: experiencing "if-then" sequences; "if using this part of the page then...," "if making the house this big, then...," etc.

s) reflecting: considering ahead of time what all one wants to include in his drawing and how to include it; determining what, out of many possible ways of ordering, is the order to be given at a given time

t) abstracting: taking forms experienced in one medium and transposing them into forms expressed within another medium; e.g., living in a "house" and then drawing "house"

u) intellectualizing: coming to know one knows and prizing that fact; coming to know one knows how to draw X and prizing the fact that one is learning to know how to draw Y and Z

v) imitating: learning by watching what others do and trying to do the same; watching others draw is possible of imitation; one can see the progression of acts

w) empathizing: taking as referent for organizing experience the internal locus of another; possible to, and required of, children when undertaking to order the drawing of a subject from "inside" the way it's made; also when undertaking to interpret the drawing of another person

x) communicating: "writing" and "speaking" by presenting one's drawing as a written message to say to others what one has learned to know, to do, and to be.

These "ing" terms are all affective-cognitive, "affective" in the sense that they refer to an action to be initiated and conducted from an ordering source within the system of the actor, "cognitive" in the sense that they imply objects of action, differentiated as such; e.g., integrating something as differentiated from something else; differentiating something as distinguished from something else; projecting something as differentiated from something else; creating something as differentiated from something else. The action of an actor has reference to the context in which it occurs.

The list of terms is indicative of the level to which observation and testing might go in relation to children drawing. It is a broader base than our measures differentiated, but the measures we make of the relationship between level of cognitive ability in drawing and level of artistic ability in drawing will indicate whether or not the concept of their intimate involvement is worth entertaining as part of a general view on the uses of drawing for generating child development.

Assuming a positive relation between level of cognitive ability in drawing and level of artistic ability in drawing, we hypothesize that a

significant positive correlation will show between each of the measures of cognitive ability in drawing (Level of Drawing a Recognizable Figure, Number of Concepts in Drawing Figure and Ground, and Level of Cognitive Performance in Drawing) and the measure of artistic ability in drawing (Level of Artistic Performance in Drawing).

2) Hypothesis B: data and interpretation

Hypothesis B: A significant positive correlation will show between the scores on each of the tests of cognitive ability in drawing and scores on the test of artistic ability in drawing.

TABLE 18

Correlations: Level of Artistic Performance in Drawing vs. the Tests of Cognitive Ability in Drawing; Total Pool of Cases

Tests	Level of artistic performance in drawing				
Items	Man	Tree	House	TV(radio)	Combin.
Level of drawing a recognizable figure					
Man	.46	.39	.41	.34	.37
Tree	.26	.41	.32	.32	.35
House	.39	.37	.49	.31	.32
TV(radio)	.33	.39	.36	.39	.41
		Mean of the correlations = .37			
Number of concepts in drawing figure & ground					
Man	.40	.32	.29	.29	.40
Tree	.21	.41	.26	.38	.37
House	.37	.44	.53	.38	.42
TV(radio)	.30	.42	.37	.44	.46
		Mean of the correlations = .37			
Level of cognitive performance in drawings					
Man	.52	.44	.44	.33	.39
Tree	.30	.41	.35	.35	.35
House	.40	.37	.51	.35	.38
TV(radio)	.36	.41	.43	.49	.42
Combin.	.44	.48	.46	.46	.57
		Mean of the correlations = .42			

The hypothesis is confirmed: 64 of the 65 correlations reach or surpass .26 which is the floor for the .01 level of significance; 58 of the 65 correlations reach or surpass .32, the floor for the .001 level of significance.

We interpret this as evidence in support of the assumption that drawing involves both cognitive and artistic abilities, and that these two abilities inter-function in preschool disadvantaged children. As children are able to draw figures which are more recognizable as forms in their environment, as they enter more concepts in their drawings which reflect observable features of subjects, and as they generally suffuse their drawings with more conceptual content, they also tend to develop as persons who can do their drawing better; being able to handle the drawing act better, they are also able to more readily include cognitive content. The two abilities complement each other in the course of developing the child to better relate the world to himself and himself to the world.

C. Concerning the Relation of Drawing Capability and Verbal Capability

1) Assumptions leading to hypotheses: Just as we assume preschool disadvantaged children have a "generalized drawing capability" we also assume preschool disadvantaged children have a "generalized verbalizing capability."

More specifically, we assume that across individuals, children will exhibit wide variability in capacities for verbalization, but that across subjects to be discussed, any given child, as of a given time in his development, will tend toward consistency in the level of verbalizing ability he brings to his discussion of any given subject, i.e., he exhibits a "generalized verbalizing capability."

Because of past experience he may have had in describing given subjects, he may be able to use more concepts in his discussion of those subjects than he is able to exhibit in his first discussions of new subjects, but he will try to discuss new subjects at the levels of ability and satisfaction he has been able to achieve in his most successful verbalizing experience. He has a standard which he seeks to attain, and is thus disposed to advance the range of his cognitive development.

Assuming generalizing tendencies in both drawing and words for individual children at any given time in their development, we assume their interrelation in the growth of a child. We assume that a child grows in his cognitive ability as he expands the range of generalization within which he can express that knowledge. At the most limited level, his knowledge pertains to a given subject, expressed within a given medium (e.g., saying "tall" pertaining to a man, expressed as a word). He grows when he is able, within that given medium, to express the same knowledge as pertaining to different subjects to which it might apply (e.g., saying "tall man," "tall tree," "tall house"). He is then not "subject-bound" and is "generalizing across subjects" within a given medium.

He grows to a further level when he is able to express that knowledge "across media," i.e., he can express his knowledge not only across subjects but in media of different orders of expression (e.g., he cannot only speak of "tall man," "tall tree," "tall house," but he can draw a "tall man," a "tall tree" and a "tall house"). He is then not "medium bound" and is "generalizing across media" of expression.

The more extended the range of generalization across subjects and across media, the more extensive is the knowledge of the child and the more he has grown both cognitively and affectively--"cognitively" because he knows more about his environment, "affectively" because he can do more, expressively, within that environment. He can differentiate and integrate his environment better and he can differentiate and integrate his actions in that environment better. He can more surely know what he knows, and more ably use his knowledge instrumentally; using his knowledge more instrumentally, he more fully owns it; the more fully he owns it, the more likely he is to promote himself as a "knower" and "doer" who seeks to know more and do more.

When, after having learned to express a given knowing in one medium, a child undertakes to express that knowing in another medium, he needs to redifferentiate what he knows and try to look at it anew. Observing different people, different trees, and different houses, he may have learned to use the word "tall" to say something about some of these people, trees, or houses as differentiated from other of these people, trees, or houses. He has learned to differentiate in the medium of speech to express a knowing he has about his environment. When undertaking to express his knowing of "tall" in a drawing of persons, trees, or houses, he has differentiations to make which are quite different from those he uses when employing the word, "tall." The auditory form of "tall," as differentiated from other auditory forms appearing in speech, is a quite different form from the visual form of "tall," as differentiated from other visual forms in the environment or in a drawing. The necessity of expression of his knowing in the new medium requires him to directly experience "tallness in the world" anew, and this time, to express the relations in visual products kinesthetically produced in a drawing. The change in medium of expression invites a new burst of growth, cognitively and affectively.

This growth is not only in expression (output) but also in impression (input). In proportion as he finds himself able to express his knowings with respect to position, size, brightness, detail, etc. in drawings, for example, he also finds reason to look at his environment anew to see, within it, the variations it offers in position, size, brightness, detail, etc. A given mode of expression invites its correlate kind of perception. As either expression or perception grows, the other tends to grow. Transposition from one medium of expression to another therefore accomplishes not only expression, but also a significant amplification of stimuli to which the child becomes receptive.

While recognizing the value of having children transpose their knowings from one medium to another, certain limitations and considerations need also to be taken into account.

Some knowings are not readily transposable from one medium to another. Indeed, it is doubtful if different senses or their correlated media of expression would have evolved if there were not some knowings which each could deliver or express that no other could deliver or express. For example, the concept of "medium" or "first" or "relation" can be expressed verbally as a knowing, but cannot be expressed, as such, in drawings or music or dance despite the fact that these media all use "medium," "first" and "relation" in their very composition. We should expect, therefore, that drawing will express some knowings that words would have great difficulty saying for a child, and that words will express some knowings that drawings would have great difficulty saying for a child. Put differently, we cannot expect all concepts to be "duplicates" as we have used the term in measures of drawing and verbalization to refer to instances where a child revealed his knowing of features of a subject, both by the way he drew and by the words he used in describing the subject. There will be knowings particular to drawing and particular to verbalization.

Some children are "more talented" in expression through one medium than through another. Their knowing can grow relatively rapidly where their talent lies, suggesting that full exercise of a talent be promoted, provided the child is challenged to use other media for expressing his knowledge in order that he have diverse ways of inviting the environment to feed him. A talent blooms into maximum power where it differentiates and integrates the maximum it can of all that life provides, no matter how that knowledge was sensed or expressed in its origin. It is therefore important that a child with a talent in a given medium be led to exercise diverse approaches to expression and their co-relative modes of perception in order that he be fed for the higher levels to which he can go in the knowings he expresses through his talent.

Apart from talent, experience also can be an important factor in the ability to transpose knowings from one medium to another. A child, in a given medium of expression, may have had no experience at all, or experience which was narrow or broad in respect to the knowings included; he may have felt his experience to have been supportive of him or frightening, intriguing to him or dull, rewarding to him or punitive. Children will show the results of their experience.

Accepting these factors to be relevant to efforts to transpose from one medium to another, we assume transposition to be a major mode of development. This assumption calls for further assumptions on how best to induct children into the use of media new to them:

a) A child needs to see others using a given medium to express their knowings if he is to entertain the prospect of his doing so.

He needs an environment in which he and "significant others" can involve themselves in the medium and exchange their experiences and learnings, accordingly.

b) In a given medium, a child needs intimate and direct support while coming to threshold levels of performance essential before he can get self-satisfaction from his own expression of his knowings in that medium. In drawing, a child needs person-to-person support for his efforts while he gains the rudimentary ability to draw a recognizable form of subjects, demonstrably expressive of his knowing about that subject. In proportion as he is able to reach threshold levels for his range of knowings, he can grow through his own direct self-engagement in drawing.

Assuming a generalized verbalizing capability and a positive relation between that capability and a generalized drawing capability, we would hypothesize that:

1) a significant positive correlation will show for the test of verbalizing capability (Number of Concepts in Words for Subject and Setting) as between the scores on the four different subjects (man, tree, house, TV(radio)) used in the test--thereby indicating a generalized verbalizing capability;

2) no significant difference will show between the mean number of concepts expressed by the children in their drawings of each of the four subjects and their word descriptions of each of the four subjects--thereby indicating concurrent development of both forms of cognitive expression in preschool disadvantaged children;

3) a significant positive correlation will show between the test of verbalizing capability (Number of Concepts in Words for Subject and Setting) and the tests of (a) cognitive ability in drawing (Level of Drawing a Recognizable Figure, Number of Concepts in Drawing Figure and Ground, Level of Cognitive Performance in Drawing), and (b) artistic ability in drawing (Level of Artistic Performance in Drawing)--thereby indicating a positive relation between verbalizing capability and drawing capability (cognitive and artistic);

4) a significant positive correlation will show for the test of verbalizing-drawing capability (Number of Duplicate Concepts in Drawing and Words) as between scores on the four different subjects--thereby indicating capability to generalize across the two media of drawing and words while also generalizing across subjects;

5) a significant positive correlation will show between the test of verbalizing-drawing capability (Number of Duplicate Concepts in Drawing and Words) and the tests of (a) cognitive ability in drawing (Level of Drawing a Recognizable Figure, Number of Concepts in Drawing Figure and Ground, Level of Cognitive Performance in Drawing), (b) artistic ability

in drawing (Level or Artistic Performance in Drawing), and (c) verbalizing ability (Number of Concepts in Words for Subject and Setting)--thereby indicating a capacity to generalize across two media signifies, also, capacity to generalize within each of the two media;

6) a significant positive correlation will show between the test of verbalizing-drawing capability (Number of Duplicate Concepts in Drawing and Words) and IQ as measured by the Harris-Goodenough Draw-a-Man Test, the Bettye Caldwell Preschool Inventory, and the Stanford-Binet Test--thereby indicating that knowledge which is generalizable across media and across subjects is relevant to measures predictive of school success.

2) Hypothesis C-1: data and interpretation

Hypothesis C-1: The test of verbalizing capability will show a positive correlation as among the scores made on its varied test items.

TABLE 19

Intercorrelations Among Test Items for the Number of Concepts in Words for Subject and Setting; Total Pool of Cases

Test items	Man	Tree	House
Man			
Tree	.17		
House	.23	.32	
TV(radio)	.30	.18	.09

Mean of the correlations = .22

Though the mean of the six correlations is .22 and above the floor (i.e., .20) for the .05 level of significance, we interpret the fact that three of the six correlations fall below .20 to mean that the hypothesis is tenuous.

In turn, we interpret this to be evidence that concepts expressed in words are relatively subject-bound for most of these preschool disadvantaged children, and that verbalizing capability (as related to subjects also used for drawing) is not yet sufficiently generalized to be found across a variety of subjects. As later data will show, some of these children do develop this ability. Cues from these cases will help explain the circumstances under which development of verbalizing capability can be fostered. Since generalized verbalizing capability is essential to later school success, the question is clearly how to do preschool teaching of the disadvantaged so that many more children develop their verbalizing capability.

3) Hypothesis C-2: data and interpretation

Hypothesis C-2: no significant difference will show between the number of concepts expressed in drawing and the number of concepts expressed in words.

TABLE 20

Means and t-Tests Comparing the Number of Concepts Expressed in Drawing with the Number of Concepts Expressed in Words; Total Pool of Cases

Test items	Mean number of concepts Expressed in drawing	Expressed in words	Significance of the diff.
Man	7.9	8.2	N.S.
Tree	2.6	3.4	.001
House	3.0	8.3	.001
TV(radio)	2.5	3.4	.001

The hypothesis is not confirmed. On the subject "man," the difference between the number of concepts expressed in drawing and the number of concepts expressed in words was not significant, but on the remaining three test items, the differences were significant, the number of concepts expressed in words being greater in each instance.

We interpret this as evidence that, with the exception of the subject "man" which appears to have had a special place in the drawing experience of the children, the tendency is for the children to know by name more features of the objects taken as subjects for drawing than they can find ways to express within their drawings. This implies that verbal conception may generally be more fully exercised and developed than drawing conception. This seems reasonable to assume in view of the much greater use of words than of drawing for communication in the daily lives of the children, but, as the data on the next and later hypotheses reveal, it would not be right to thereupon assume that words are, therefore, a better medium than drawing for systematic cognitive development of preschool disadvantaged children.

"Written" drawings have an advantage over spoken words in that the "writing" of the drawing remains visible as a product the child can publicly claim to himself and to others to be his own. The presence of the drawn concepts in visible form allows for ready feedback to the child in support of his "knowing he knows" and in proving that fact to himself and others. Progression in self-owned learning is thereby more readily provided by drawing than spoken words, alone, can provide. The fact that a greater number of concepts is expressed in words than is expressed in drawing is not, therefore, ipso-facto grounds for concluding that cognitive development is better served by words than by drawing.

4) Hypothesis C-3a: data and interpretation

Hypothesis C-3a: A significant positive correlation will show between the number of concepts expressed in words about given subjects and scores on tests of cognitive ability expressed in drawing those subjects.

TABLE 21

Correlations: Number of Concepts in Words for Subject and Setting vs. the Tests of Cognitive Ability in Drawing; Total Pool of Cases

Tests	Number of concepts in words for subject and setting			
Items	Man	Tree	House	TV(radio)
Level of drawing a recognizable figure				
Man	.28	.18	.03	.16
Tree	.11	.16	.07	.14
House	.17	.06	.11	.05
TV(radio)	.18	.11	.12	.12
	Mean of the correlations = .13			
Number of concepts in drawing figure & ground				
Man	.51	.25	.13	.13
Tree	.24	.19	.18	.19
House	.24	.19	.14	.10
TV(radio)	.28	.17	.16	.27
	Mean of the correlations = .21			
Level of cognitive performance in drawings				
Man	.14	.19	.01	.11
Tree	.14	.19	.06	.12
House	.11	.11	.09	.02
TV(radio)	.13	.19	.09	.13
Combin.	.15	.17	.10	.06
	Mean of the correlations = .12			

The hypothesis is not confirmed. Of the 52 correlations, 45 fall below .20, the floor for significance at the .05 level. Of the seven correlations attaining a significance level, five relate to the subject of "man." On this one subject, there is some tendency for children who perform at a given level in the number of concepts they express in words, to also perform at that level relative to concepts expressed in

.wing. In respect to other subjects, however, this relation does not appear.

We interpret this as evidence that preschool disadvantaged children are at a stage where the concepts they develop in the medium of words and the concepts they develop in the medium of drawing are not yet functionally associated. One might hypothesize that, for these children, the stage of their learning is so elementary for any medium that association across media is too much to expect of them, as yet. One might also hypothesize that their learning might be sufficiently advanced, but that cross-association between words and drawing is not exercised in the environment in which they live: they are having experiences which are primarily visual, and experiences which are primarily verbal, but these two are sufficiently separated that the children do not need, in their daily lives, to cross reference the one kind of cognitive content with the other kind of cognitive content. We shall discuss these alternatives in the summary (of this section) after more data are introduced.

5) Hypothesis C-3b: data and interpretation

Hypothesis C-3b: A significant positive correlation will show between scores on concepts expressed in words about given subjects, and scores on a test of artistic ability in the drawing of those subjects.

TABLE 22

Correlations: Number of Concepts in Words for Subject and Setting vs. Level of Artistic Performance in Drawing; Total Pool of Cases

Test Items	Number of concepts in words for subject and setting: Man	Tree	House	TV(radio)
Level of artistic performance in drawing				
Man	.12	.25	.11	.01
Tree	.14	.25	.04	.03
House	.07	.22	.12	.01
TV(radio)	.12	.24	.14	.11
Combin.	.10	.24	.02	.08
Mean of the correlations = .12				

The hypothesis is not confirmed. Of the 20 correlations, 15 fall below the .05 level of significance, the floor for which is a correlation

of .20. The five correlations which do reach significance levels are all the correlations which pertain to concepts in words about "tree"; the consistency of this result for "tree" suggests some systematic factor to be operative, but we have as yet, no hypothesis to explain it.

We interpret the main finding to be that concepts expressed in words about given subjects do not tend to predict the level of artistic performance of a child in the drawing of those or other subjects. Drawing, as an art form, and verbalization, as a cognitive form, would appear to be two processes not yet associated in these children.

6) Hypothesis C-4: data and interpretation

Hypothesis C-4: The test of duplicate concepts, i.e., concepts expressed in both drawings and words, will show a significant correlation as among the scores made on its varied test items.

TABLE 23

Intercorrelations Among Test Items for the Number of Duplicate Concepts in Drawing and Words; Total Pool of Cases

Test items	Man	Tree	House
Man			
Tree	.33		
House	.36	.34	
TV(radio)	.23	.37	.28

Mean of the correlations = .32

The hypothesis is confirmed: all correlations reach the .05 level of significance (floor of .20); five of the six reach the .01 level (floor of .26); four of the six reach the .001 level (floor of .32).

We interpret this to be evidence that the level at which preschool disadvantaged children are able to express concepts of a given subject in the two media of drawing and words tends to be the level at which they are able to express concepts of other subjects in the two media; the ability generalizes across subjects. The ability to generalize across media ("duplicates") carries with it the tendency also to generalize across subjects.

7) Hypothesis C-5a: data and interpretation

Hypothesis C-5a: A significant positive correlation will show between the number of concepts expressed in both drawing and words ("duplicates") about given subjects and the scores on tests of cognitive ability in the drawing of those subjects.

TABLE 24

Correlations: Number of Duplicate Concepts in Drawing and Words vs. the Tests of Cognitive Ability in Drawing; Total Pool of Cases

Tests	Number of duplicate concepts in drawing and words			
Items	Man	Tree	House	TV(radio)
Level of drawing a recognizable figure				
Man	.59	.30	.39	.18
Tree	.39	.44	.48	.30
House	.41	.28	.54	.17
TV(radio	.33	.38	.38	.41
	Mean of the correlations = .37			
Number of concepts in drawing figure & ground				
Man	.57	.30	.28	.14
Tree	.40	.67	.43	.33
House	.48	.33	.65	.28
TV(radio)	.37	.41	.40	.56
	Mean of the correlations = .41			
Level of cognitive performance in drawings				
Man	.47	.24	.40	.19
Tree	.37	.34	.44	.26
House	.38	.24	.43	.25
TV(radio)	.34	.35	.40	.32
Combin.	.41	.37	.47	.32
	Mean of the correlations = .34			

The hypothesis is confirmed. Of the 52 correlations, 47 are significant at the .05 level (floor of .20); 45 are significant at the .01 level (floor of .26); 39 are significant at the .001 level (floor of .32).

We interpret this to be evidence that the level at which a preschool disadvantaged child is able to express concepts of given subjects in both the media of drawing and words, compared to his peers, is predictive of the level at which the child, compared to his peers, will be able to express concepts in his drawings of the same subjects. The ability to transfer concepts across media is predictive of the ability to express concepts in drawings.

8) Hypothesis C-5b: data and interpretation

Hypothesis C-5b: A significant positive correlation will show between the number of concepts expressed in both drawing and words ("duplicates") about given subjects and the scores on the test of artistic performance in the drawing of those subjects.

TABLE 25

Correlations: Number of Duplicate Concepts in Drawing and Words vs. Level of Artistic Performance in Drawing; Total Pool of Cases

Test Items	Number of duplicate concepts in drawing and words: Man	Tree	House	TV(radio)
Level of artistic performance in drawing				
Man	.29	.12	.23	.23
Tree	.29	.29	.35	.17
House	.28	.16	.40	.19
TV(radio)	.23	.32	.33	.33
Combin.	.24	.29	.29	.25
	Mean of the correlations = .26			

The hypothesis is confirmed. Of the 20 correlations, 16 reach the .05 level (floor of .20); 11 reach the .01 level (floor of .26).

While the correlations between "duplicates" and artistic performance in drawing are not as high or as consistent as the correlations between "duplicates" and cognitive performance in drawing, there is, nonetheless, a correlation indicative of a relationship between the level of ability to transfer across media in conceptual matters and the level of artistic ability in drawing.

9) Hypothesis C-5c: data and interpretation

Hypothesis C-5c: A significant positive correlation will show between the number of concepts expressed in both drawing and words ("duplicates") about given subjects and the number of concepts expressed in words about the same subjects.

TABLE 26

Correlations: Number of Duplicate Concepts in Drawing and Words vs. Number of Concepts in Words for Subject and Setting; Total Pool of Cases

Test Items	Number of duplicate concepts in drawing and words: Man	Tree	House	TV(radio)
Number of concepts in words for subject & setting				
Man	.54	.18	.09	.07
Tree	.25	.38	.22	.15
House	.14	.20	.15	.13
TV(radio)	.27	.18	.08	.33
	Mean of the correlations = .21			

The hypothesis is weakly confirmed. Of the 20 correlations, 11 reach the .05 level (floor of .20), and nine do not. While the correlations between "duplicates" and the number of concepts expressed in words are not as high or as consistent as the correlations between "duplicates" and either cognitive performance in drawing or artistic performance in drawing, there is, nonetheless, a correlation indicative of some relationship between the ability to transfer concepts across media and the ability to produce concepts in words, granted the same items are used in all measures. More succinctly, the ability to transfer concepts across media is slightly indicative of the ability to express concepts in words.

Taking into account the interpretations of data on Hypotheses C-5a, b, and c, the situation seems to be that disadvantaged preschool children who can do well in expressing themselves conceptually across the two media of drawing and words can be expected to express themselves at comparable levels conceptually in doing their drawings; the relation still holds, but in lesser degree, for their expressions artistically in drawing; the relation holds tenuously, also, for their expressions cognitively in words.

The assumption that development of the ability to conceptualize across media is a mark of development, as well, for conceptualizing within either medium appears to be worth holding. The fact that this holds better for drawing than it holds for words suggests that the children in this group are more generalized in their ability to draw than they are in their ability in verbalization. Drawing would appear to be a more stable initial medium through which to initiate efforts to develop cognitive abilities than words appear to be.

10) Hypothesis C-6: data and interpretation

Hypothesis C-6: A significant positive correlation will show between scores on concepts expressed in both drawing and words ("duplicates") and scores on IQ as measured by the Harris-Goodenough Draw-a-Man Test, the Bettye Caldwell Preschool Inventory, and the Stanford-Binet Test.

By coincidence of other research projects, we were able to obtain scores on the Bettye Caldwell Preschool Inventory for 126 of our American group on whom we had scores for our measure of "duplicate concepts." Similarly, we were able to obtain scores on the Stanford-Binet Test for 90 of our Israeli group on whom we had scores for our measure of "duplicate concepts." Added to our Harris-Goodenough Test, we therefore had three measures on which to get some indication of the relationship between scores on "duplicate concepts" and IQ measures.

To have these findings comparable from test to test, it was necessary to limit the data on "duplicate concepts" to the results we had available on the subject "man," since it was only on this subject that we had both drawings and word reports from the Israeli children.

TABLE 2

Correlations: Number of Duplicate Concepts in Drawing and Words vs. Scores on Three IQ Tests; Limited Sampling

IQ Tests	Number of duplicate concepts in drawing and words	
	Correlation	Level of significance
Harris Draw-a-Man Test	.57	.001
Bettye Caldwell Preschool Inventory	.20	.05
Stanford-Binet Test	.21	.05

The hypothesis is confirmed at the .001 level of significance for the Harris-Goodenough Test which uses a drawing of a man as a source for its scoring. It is also confirmed at the .05 level of significance for the two tests (Stanford-Binet and Bettye Caldwell Preschool Inventory) which do not use drawings as a source for scoring.

We interpret these findings as evidence of a relationship between the capacity of these children to express concepts in both drawing and words and their capacity to express responses on intelligence tests which reflect comparable levels of "IQ" ability. The difference in the level of correlation as between the Harris-Goodenough Test and the two remaining tests serves to suggest the following line of reasoning: insofar as the Harris-Goodenough scores predict later school success through the use of drawings as a source of information, a school program which uses drawing and words as a source of stimulation may develop abilities needed for school success. If drawing is useful for testing, it should also be useful for teaching. High correlations with duplicate concepts in the case of Harris-Goodenough suggests high relevance of teaching which emphasizes drawing and words as means of conceptual development.

D. Concerning the Similarity of the Two National Groups

1) Assumptions leading to hypotheses: We assume that preschool disadvantaged children in Israel will show initial levels of ability in drawing and related verbal expression which are similar to the levels shown by preschool disadvantaged children in the United States. This assumption is based on a series of observations:

Both societies are operating on the "modernizing" trend characteristic of Western culture.

Those who succeed in the Israeli society have the same basic patterns of abilities and life styles as those who succeed in the American society.

"Advantaged" families in the two countries behave much alike in the way they rear their children.

These children generally succeed in school.

Schools are styled in such a way that the consecutive success of a child in school, year after year, is predictive of increasing advantage for him in society.

Those children not reared in advantaged homes, and/or failing in school are relatively "disadvantaged."

The parents of disadvantaged children are likely to come from non-modernizing cultures; in Israel, immigrants from North African or Middle Eastern countries; in America, immigrants to the cities from rural-poverty regions, or minority group residents living in the inner-cities.

In their native setting, these cultures may be quite strong and adaptive; in the modernizing setting, they tend to be non-adaptive and not to lead to success unless specific forms of aid are provided to help them adapt.

Major cues to the kind of aid needed by disadvantaged preschool children come from comparison and contrast of the child-rearing practices of the parents in the advantaged homes and the disadvantaged homes.

Both are likely to be affectionate, loving, and caring; both are likely to provide the elementary physical needs (food, clothing, shelter); both are likely to want their children to be educated, to succeed in school, and to have the advantages of success in society.

In advantaged homes, parents are likely to style their child-rearing practices on the following, usually implicit, assumptions: a parent is also a teacher; a child has a great deal to learn; a child should learn as much as he can as soon as he can if he is to have the best chance; the child needs varied experiences in varied settings; he needs to be taken places to see, hear, feel, and be stimulated by many kinds of situations and people; a variety of means of expression is valuable; the child needs time, opportunity, and materials for drawing, painting, socio-dramatic play, music, word games, thinking games, dexterity games, etc.; a child should enjoy being read to; he should know reading is fun; he should talk freely; what a child says should be paid attention to; his questions are important; he should be encouraged to ask questions; one should provide explanations as close to what he can understand as possible; he should be led to approach the world as if it were to be understood; one wants to make things reasonable for him; he needs to be able to think he should be made to think whenever opportunity allows; learning should be something he enjoys, gets to do on his own and in your company; the child is already on his way to becoming adult; as an adult, he will be expected to make a place for himself; he will be able to make that place if he learns, and learns how to teach himself; "I am not only his parent and teacher, but also his companion; I will treat him as one who can learn and develop in preparation for a world which will be, in important respects, new, even to me; he has to know how to use his head. Preschools are valuable to give him companions and greater variety in his learning; its aims and mine are the same; its methods and mine are the same--essentially."

In disadvantaged homes, parents are likely to style their child-rearing practices on the following, usually implicit assumptions: a parent is a parent; a child is a child; he will soon enough have burdens to carry; let him be enjoyed for what he now is; let him be a child while he can be; there are appropriate things for a child to do; I will see he does the right thing; that's part of my job as a parent; some day he will go to school; in school they will be able to teach him; teaching is the business of the teachers; the teachers will know how; I am a parent, not a teacher; my child ought to learn from the teachers; it's important

he gets to be what I can't be; the teachers will have to help him; I've done the best I could; the world is hard; the world is the way it is; you endure in it; you don't ask too much of it; you don't ask too many questions; there's no point trying very hard to understand it; many times that leads to more pain than it's worth; "I've had to settle for what I can do; my future now depends on what my child can do; I can't give him much; I can't take him much of anywhere; he's got brothers and sisters; he can be one of the children; let him be so; he has a chance to go to preschool; I don't know what that is, really, but the teachers ought to be able to help him; I hope I can keep him going there; he will learn from them; that's good; maybe they can take him through; I hope so."

The essence of the difference in child-rearing practices, as they affect the program of the preschool, is that the advantaged home operates as a teaching-learning environment as well as a sustaining environment; the disadvantaged home operates primarily as a sustaining environment with relatively little capacity to operate also as a teaching-learning environment. The child of an advantaged home can take school as an extension of what he has already become familiar with; the child of a disadvantaged home takes school as a different environment from home. To succeed in school, the disadvantaged child needs to be inducted into the teaching-learning way of life; preschools for disadvantaged children need, deliberately, to provide such induction.

The program in Israel and the United States for disadvantaged preschool children, therefore, needs to be essentially the same, and the conditions are such that what tends to succeed in Israel should tend to succeed in the United States, and vice-versa.

We have assumed, therefore, that preschool disadvantaged children both in Israel and in the United States need a common kind of preschool program. We have assumed, as well, that this program calls for instruments of diagnosis which reveal a beginning level of operation from which the children could develop in their teaching-learning capability, and which, also, aid teachers in keeping track of specific increments of ability which are essential to the main thrust. The instruments are, in this sense, derived from the needs of a modernizing society and the common goal, in both countries, of increasing teaching-learning competence.

Having made these assumptions, we further assume that the diagnostic data derived from the tests in the two countries will show initial levels of ability in drawing and related verbal expression which are much alike, reflecting disadvantaged to have relatively the same operational meaning in both environments, the judgments being made against the common need for modernizing capability in both settings.

Granted certain abilities are needed for success in a modernizing school and society, and granted tests which pertain to abilities of that kind, we hypothesize American and Israeli disadvantaged preschool children will show similar characteristics on those tests; more specifically, we hypothesize that, within the range of data for comparison, the two national groups will show results similar to each other, a) on the hypotheses thus far reported (A through C), b) on levels of performance in measures of drawing and verbalization, and c) on levels of performance as related to IQ and to age and grade level (prekindergarten and kindergarten).

When comparing the two national groups, the usable data is that for items on which results are available from both groups. The number of tests given the Israeli group was less than the number of tests given the American group; the Israeli group did test drawings of "man," "house," and "radio" (the last comparable to "TV" in the United States), but did not do a test drawing of "tree" or a "combination" drawing. The Israeli group did a word test on "man," but not on "house" or "radio" (or "tree"). Accepting these limits, we present the following specific hypotheses and relevant data.

2) Hypothesis D-1: data and interpretation

Hypothesis D-1: On Hypotheses A through C, the findings for the two national groups will be similar and like the findings for the total pool of cases.

a) Similarities on Hypothesis A-1: For the total pool of cases and each national group, each test of cognitive drawing ability will show a significant positive correlation as among scores made on its varied test items. (See Table 28 on the following page.)

The hypothesis was confirmed on the total pool of cases. It is again confirmed on the more limited data from the total pool presented here, and on data from each national group. All correlations are well above .32, the floor for significance at the .001 level.

In each national group, the intercorrelations among the test items indicate that the children are able to generalize in their cognitive drawing abilities. Correlations are generally higher for the Israeli children than for the American children.

b) Similarities on Hypothesis A-2: For the total pool of cases and for each national group, the test of artistic drawing ability will show a significant positive correlation as among scores made on its varied test items.

TABLE 28

Intercorrelations Among Test Items for the Tests of Cognitive Ability in Drawing; Comparing National Groups

Test and Test items	Total pool of cases	American	Israeli
Level of drawing a recognizable figure			
Man with house	.61	.53	.68
Man with TV(radio)	.55	.41	.66
House with TV(radio)	.54	.55	.53
Number of concepts in drawing figure and ground			
Man with house	.49	.36	.67
Man with TV(radio)	.51	.39	.64
House with TV(radio)	.61	.54	.70
Level of cognitive performance in drawing			
Man with house	.75	.73	.77
Man with TV(radio)	.63	.59	.71
House with TV(radio)	.68	.66	.75

TABLE 29

Intercorrelations Among Test Items
for Level of Artistic Performance in Drawing;
Comparing National Groups

Test and Test items	Total pool of cases	American	Israeli
Level of artistic performance in drawing			
Man with house	.57	.55	.60
Man with TV(radio)	.46	.44	.48
House with TV(radio)	.49	.43	.55

The hypothesis was confirmed on the total pool of cases. It is again confirmed on the more limited data from the total pool presented here, and on data from each national group. All correlations are well above .32, the floor for significance at the .001 level.

In each national group, the intercorrelations among the test items indicate that the children are able to generalize in their artistic performance in drawing. Correlations are somewhat higher for the Israeli children than for the American children.

c) Similarities on Hypothesis B: For the total pool of cases and for each national group, a significant positive correlation will show between the scores on each of the tests of cognitive ability in drawing and scores on the test of artistic ability in drawing.

TABLE 30

Correlations: Level of Artistic Performance in Drawing vs. the Tests of Cognitive Ability in Drawing; Comparing National Samples

Tests	Level of artistic performance in drawing								
	Total Pool of Cases			American			Israeli		
	Man	House	TV(rad.)	Man	House	TV	Man	House	Radio
Level of drawing a recognizable figure									
Man	.46	.41	.34	.42	.40	.40	.54	.50	.30
House	.39	.49	.31	.35	.41	.41	.44	.59	.23
TV(radio)	.33	.36	.39	.33	.35	.48	.41	.48	.32
Number of concepts in drawing figure and ground									
Man	.40	.29	.29	.37	.27	.33	.55	.50	.27
House	.37	.53	.38	.37	.56	.45	.41	.61	.32
TV(radio)	.30	.37	.44	.34	.40	.54	.40	.58	.40
Level of cognitive performance in drawing									
Man	.52	.44	.33	.53	.42	.38	.53	.50	.27
House	.40	.51	.35	.40	.42	.41	.42	.63	.29
TV(radio)	.36	.43	.49	.38	.40	.56	.37	.55	.41

The hypothesis was confirmed on the total pool of cases; it is again confirmed on the more limited data from the total pool as presented here, and on data from each national group. All of the 27 correlations from "the total pool" reported above surpass .26, the floor for the .01 level of significance; 23 of the 27 reach or surpass .32, the floor for the .001 level of significance. All of the 27 correlations from the American group reach the .01 level, and 26 of the 27 reach the .001 level. All but one of the 27 correlations from the Israeli group reach the .01 level, and 23 of the 27 reach the .001 level.

In each national group, cognitive and artistic abilities in drawing are inter-functioning in their relationship; the two abilities complement each other in the course of developing the child through drawing. Consistently, the Israeli children show higher correlations for this interrelation on the subjects of "man" and "house" than do the American

children, while on the subject of "TV(radio)," the American children show higher correlations. The latter point may reflect the fact that the American children had TV available to them in their homes while the Israeli children at the time the data was collected had radio, and not TV, available to them in their homes. TV is more demanding of visual attention, and more closely connected to what can be shown through drawing.

d) Similarities on Hypothesis C-1: For the total pool of cases and for each national group the test of verbalizing capability will show a positive correlation as among the scores made on its varied test items.

Data is not available for comparing the two national groups on this hypothesis.

e) Similarities on Hypothesis C-2: For the total pool of cases and for each national group, no significant difference will show between the number of concepts expressed in drawing and the number of concepts expressed in words.

TABLE 31

Means and t-Tests Comparing the Number of Concepts in Drawing with the Number of Concepts in Words for the Subject "Man"; Comparing National Groups

	Mean Number of Concepts in		
	Drawing	Words	Sig. diff.
Total pool of cases	7.9	8.2	N.S.
American	9.4	9.6	N.S.
Israeli	5.9	6.1	N.S.

The hypothesis is confirmed. On the subject "man," the number of concepts expressed by drawing and the number of concepts expressed by words were not significantly different in the total pool of cases in the American group or in the Israeli group.

Granting the tenuousness of using data from but one test item, the suggestion is that the children in both national groups are able to use about the same number of concepts in either medium when referring

to a subject familiar to them, and amenable to being described in both drawing and words.

f) Similarities on Hypothesis C-3a: For the total pool of cases and each national group, a significant positive correlation will show between the number of concepts expressed in words about given subjects and scores on tests of cognitive ability in drawing those subjects.

TABLE 32

Correlations: Number of Concepts in Words for the Subject "Man" vs. Tests of Cognitive Ability in Drawing; Comparing National Groups

	Number of concepts in words for the subject "Man"								
	Total Pool of Cases			American			Israeli		
Tests	Man	House	TV(rad.)	Man	House	TV	Man	House	Radio
Level of drawing a recognizable figure	.28	.17	.18	.19	.06	.04	.38	.36	.32
Number of concepts in drawing figure and ground	.51	.24	.28	.47	.13	.14	.47	.38	.40
Level of cognitive performance in drawing	.14	.11	.13	.04	.01	.03	.42	.37	.33

The hypothesis was not confirmed on the total pool of cases. It is not confirmed on the more limited data from the total pool presented here: of the nine correlations, five are below .20, the floor for the .05 level of significance. It is not confirmed, either, on the American data; only one correlation reaches above the .05 level; the eight remaining correlations are generally quite low. It is, however, confirmed by the Israeli data: all nine correlations are at or above .32, the floor for significance at the .001 level.

Here the two national groups diverge: the American children show little or no tendency to associate the levels at which they express concepts in words within levels at which they express concepts in drawings; the Israeli children show consistent and substantial tendency to associate the levels at which they express concepts in words with the

levels at which they express concepts in drawings. Conceptual development for the American children would appear to be separated into two "tracks," one being the visual which is reflected in their ability to generalize across subjects when drawing, and the other being verbal which is reflected in their not-so-well developed and tenuous ability to generalize across subjects in words. The suggestion is that American children in the inner-city can live in these two tracks without daily need to relate experience across from the one medium to the other. The Israeli children, on the other hand, would appear to be living in circumstances where there is verbal exercise on the occasion of visual exercise so that conceptual development is reflected in both media, associatively.

g) Similarities on Hypothesis C-3b: For the total pool of cases and for each national group, a significant positive correlation will show between scores on concepts expressed in words about given subjects and scores on a test of artistic ability in drawing of those subjects.

TABLE 33

Correlations: Number of Concepts in Words for the Subject "Man" vs. the Level of Artistic Performance in Drawing; Comparing National Groups

	Number of concepts in words for the subject "Man"								
	Total Pool of Cases			American			Israeli		
Test	Man	House	TV	Man	House	TV	Man	House	Radio
Level of artistic performance in drawing	.12	.07	.12	.07	.06	.09	.35	.32	.26

The hypothesis was not confirmed on the total pool of cases. It is not confirmed on the more limited data from the total pool presented here; all three correlations are quite low. It is not confirmed, either, on the American data; the three correlations are very low. It is, however, confirmed by the Israeli data; all three correlations are at or above .26, the floor for the .01 level of significance.

Again the two national groups diverge: as just reported for the relationships of cognitive ability in drawing to words, so also for the relationships of artistic ability in drawing to words; the American children show virtually no tendency to associate levels at which they express concepts in words with levels at which they perform in artistic dimensions of their drawing; the Israeli children show consistent and substantial tendency to associate levels at which they

perform in artistic dimensions of their drawing. This is further evidence of disassociation between the world which drawing can reflect and the world which words can reflect for the American children, while for the Israeli children, there is association.

h) Similarities on Hypothesis C-4: For the total pool of cases and for each national group, the test of duplicate concepts, i.e., concepts expressed in both drawings and words, will show a significant positive correlation as among the scores made on its varied test items.

Data is not available for comparing the two national groups on this hypothesis.

i) Similarities on Hypothesis C-5a: For the total pool of cases and for each national group, a significant positive correlation will show between the number of concepts expressed in both drawing and words ("duplicates") about given subjects and the scores on tests of cognitive ability in the drawing of those subjects.

TABLE 34

Correlations: Number of Duplicate Concepts in Drawing and Words for the Subject "Man" vs. the Tests of Cognitive Ability in Drawing; Comparing National Groups

	Number of duplicate concepts for the subject "Man"								
	Total Pool of Cases			American			Israeli		
Test	Man	House	TV(rad.)	Man	House	TV	Man	House	Radio
Level of drawing a recognizable figure	.59	.41	.33	.52	.31	.20	.70	.58	.45
Number of concepts in drawing figure and ground	.57	.48	.37	.43	.40	.24	.82	.57	.52
Level of cognitive performance in drawing	.47	.38	.34	.39	.32	.27	.68	.54	.45

The hypothesis was confirmed on the total pool of cases. It is again confirmed on the more limited data from the total pool presented here; all nine correlations surpass .32, the floor for a level of significance of .001. It is confirmed by the American data, seven of the nine correlations reaching or surpassing .26, the floor for a level of

significance of .01. It is confirmed also by the Israeli data, all nine of the correlations well above the floor for a significance of .001.

For both the American and Israeli groups, the level of a child s ability in producing duplicate concepts is predictive of his ability to produce concepts in his drawings (whether duplicates or not). The ability to express concepts across the two media of drawing and words is predictive of the ability to express concepts in the medium of drawing.

j) Similarities on Hypothesis C-5b: For the total pool of cases and for each national group, a significant positive correlation will show between the number of concepts expressed both in drawing and words ("duplicates") about given subjects and the scores on the test of artistic performance in the drawing of those subjects.

TABLE 35

Correlations: Number of Duplicate Concepts in Drawing and Words for the Subject "Man" vs. Level of Artistic Performance in Drawing; Comparing National Groups

	Number of duplicate concepts for the subject "Man"								
	Total Pool of Cases			American			Israeli		
Test	Man	House	TV(rad.)	Man	House	TV	Man	House	Radio
Level of artistic performance in drawing	.29	.28	.23	.28	.35	.31	.42	.37	.17

The hypothesis was confirmed on the total pool of cases. It is again confirmed on the more limited data from the total pool presented here; all three correlations are above .20, the floor for the .05 level. It is confirmed in the American group, all three correlations being above .26, the floor for the .01 level of significance. It is also confirmed by the Israeli group on two of the three correlations, these being on the subjects of "man" and "house," the correlation on "radio" falling below .20, the floor for the .05 level.

For both the American and Israeli groups, the level of ability to express concepts in both drawing and words tends to be predictive of the level of artistic performance in drawing. In both the cognitive and artistic dimensions, the ability to draw is strengthened as the ability to conceptualize across drawing and words is developed.

k) Similarities on Hypothesis C-5c: For the total pool of cases and for each national group, a significant positive correlation will show between the number of concepts expressed in both drawing and words ("duplicates") for the subject "man" and the number of concepts expressed in words about the subject "man."

TABLE 36

Correlations: Number of Duplicate Concepts in Drawing and Words for "Man" vs. Number of Concepts in Words for "Man"; Comparing National Groups

	Number of duplicate concepts for the subject "Man"		
Test	Total Pool of Cases	American	Israeli
Number of concepts in words for the subject "man"	.54	.45	.68

The more general hypothesis, pertaining to all test items, was but weakly confirmed by the total pool of cases; for the subject of "man," alone, as here reported, the hypothesis is confirmed for this limited item from the total pool; it is also confirmed by each national group, all correlations being above .32, the floor for significance at the .001 level.

On the subject of "man," both American and Israeli children show an ability to be more productive in the concepts they express in words as they are able to be more productive in the concepts they can express in both words and drawing. The ability to conceptualize across the two media is predictive of ability to conceptualize in either medium. This applies for the subject "man," with Israeli children producing a larger correlation than the American children. The question is open whether the American children would show predictive relations for other subjects. Previous data suggests it is likely the Israeli children would.

l) Similarities on Hypothesis C-6: For the total pool of cases and for each national group, a significant positive correlation will show between scores on concepts expressed both in drawing and words ("duplicates") and scores on IQ as measured by the Harris-Goodenough Draw-a-Man Test, the Bettye Caldwell Preschool Inventory, and the Stanford-Binet Test.

TABLE 37

Correlations: Number of Duplicate Concepts in Drawing and Words on the Subject "Man" vs. Scores on Three IQ Tests; Comparing National Groups

Tests	Number of duplicate concepts for the subject "Man" Total Pool of Cases	American	Israeli
Harris Draw-a-Man Test	.57	.48	.70
Bettye Caldwell Preschool Inventory		.20	
Stanford-Binet Test			.21

The findings on the total pool of cases are repeated here in greater detail than the format allowed in the previous report of data from the total pool. The correlation of .57 for the Harris Draw-a-Man Test on the total pool drops to .48 for the American children and rises to .70 for the Israeli children, both national groups being well above .32, the floor for significance at the .001 level. Scores on the Bettye Caldwell Inventory were available only on American children, showing a correlation at .20 (the .05 level of significance), and scores on the Stanford-Binet were available only on Israeli children, showing a correlation at .21 (the .05 level of significance).

The ability to express concepts in both drawing and words appears to have a relationship to the ability to express responses on IQ tests which are presumed to relate to capacity to succeed in school. This holds for both national groups. The higher correlation of the Israeli children on the Harris-Goodenough suggests these children, compared to the American children, may be able to benefit more quickly from a teaching program which emphasizes drawing and words as means to cognitive development. Later data from the teaching results will help to test this hypothesis.

Summary on Hypothesis D-1: Of the 10 hypotheses which had been applied to the total pool of cases and for which data was also available for comparison between the two national groups, the findings for the total pool held in eight instances. The two national groups generally responded alike to the measures used in dealing with the hypotheses.

Where differences between the two national groups appeared was in connection with the two hypotheses having to do with the relation between drawing ability and related verbal ability, the first hypothesis having to do with the relationship between cognitive ability in drawing and verbal ability, and the second hypothesis having to do with the relationship between artistic ability in drawing and verbal ability. In each case Israeli children showed a significant positive relation and the American children did not.

The inference is that factors are operating in the daily lives of the two groups which account for their different modes of behavior when relating verbalization to abilities needed in drawing. For the Israeli children, it would appear that talking is a natural accompaniment of visualization and consequent drawing; for the American children, it would appear that talking is done in a context which is different from the context in which they experience their world visually. Later we will amplify what we take these differences in daily life to be, as between the Israeli and American children.

3) Hypothesis D-2: data and interpretation

Hypothesis D-2: For any given test and test item, no significant difference will show between the means of the scores for the two national groups.

TABLE 38

Means and t-Tests: Comparing National Groups on Tests of Drawing Ability and Tests of Related Verbal Ability

Tests	Man			House			TV (radio)		
	Am.	Is.	Sig. diff.	Am.	Is.	Sig. diff.	Am.	Is.	Sig. diff.
Drawing Tests									
Level of drawing a recognizable figure	3.0	2.7	.01	2.6	2.4	.05	2.6	2.1	.01
Number of concepts in drawing figure and ground	9.4	5.9	.01	3.7	2.3	.01	3.2	1.6	.01
Level of cognitive performance in drawing	2.2	2.0	N.S.	2.1	2.1	N.S.	2.1	1.7	.01
Level of artistic performance in drawing	3.3	3.4	N.S.	3.6	4.0	.01	3.0	3.0	N.S.
Verbal Test									
Number of concepts in words for subject and setting	9.6	6.1	.01						
Verbal-Drawing									
Number of duplicate concepts in drawing and words	4.3	2.8	.01						

The hypothesis is not confirmed for any of the three test items on the tests of drawing scored by the preschool teachers, i.e., on Level of Drawing a Recognizable Figure, and Number of Concepts in Drawing Figure and Ground. It is not confirmed for the one test item available for use in the tests which include words, i.e., in Number of Concepts

in Words for Subject and Setting, and Number of Duplicate Concepts in Drawing and Words. It is confirmed for two of the three test items on each of the two tests done by art educators, i.e., on Level of Cognitive Performance in Drawing, and Level of Artistic Performance in Drawing.

The general trend in means is toward significant difference between the two national groups; in the table, 14 cells of comparison are shown; the American children were significantly higher in nine cells, the Israeli children in one; non-significant differences appeared in four cells. From this data alone, it would appear that the hypothesis is generally rejected.

However, we have elsewhere reported a six months differential in age between the American and Israeli children, the American children being older; we also reported a five point differential in the Harris IQ, the American children having the higher mean. Anticipating that these factors may account for the significant differences between the two national groups, we did a one-way Analysis of Covariance to hold age and IQ constant. The results are reported in the following table.

TABLE 39

Significance of the Difference Between the Two National Groups: Analysis of Variance and Analysis of Covariance, Holding Age and IQ Constant

Tests	Sig. of diff. between national groups			
	Analysis of variance	Analysis of covariance		
		IQ constant	Age constant	Age & IQ constant
on test item - Man				
Lev. of dr. recog. fig.	.01	N.S.	N.S.	N.S.
No. con. in dr. fig. and grnd.	.01	.01	.01	.01
Lev. cog. perf. in dr.	N.S.	N.S.	N.S.	N.S.
Lev. art. perf. in dr.	N.S.	N.S.	N.S.	N.S.
No. con. in wds. for subj. and set.	.01	.01	.01	.01
No. dupl. con. in dr. and words	.01	.01	.01	.01
on test item - House				
Lev. of dr. recog. fig.	.05	N.S.	N.S.	N.S.
No. con. in dr. fig. and grnd.	.01	N.S.	N.S.	N.S.
Lev. cog. perf. in dr.	N.S.	N.S.	N.S.	N.S.
Lev. art. perf. in dr.	.01*	.01*	.01*	.01*
on test item - TV(radio)				
Lev. of dr. recog. fig.	.01	.01	.01	.01
No. con. in dr. fig. and grnd.	.01	.01	.01	.01
Lev. cog. perf. in dr.	.01	.05	N.S.	N.S.
Lev. art. perf. in dr.	N.S.	N.S.	N.S.	N.S.

*Israeli children higher; otherwise, where significant differences occur, American children are higher.

The column under Analysis of Variance shows 14 cells of data, four of which are "not significant"; this data parallels that of the previous table where the means are not adjusted. When Analysis of Covariance is used, the number of cells of data which are "not significant" increases to about [illegible], i.e., to seven or eight: seven when holding IQ constant, eight when holding age constant, and eight when holding both age and IQ constant. This is evidence that each of the factors of IQ (where the American children are five points higher) and of age (where the American children are six months older) and of the two factors taken together do, to an important degree, account for the differences between the means favoring the American children in every cell but one.

There are, however, significant differences that remain. On analysis, these turn out to be associated with specific test items for specific tests, indicating that the children in the two groups have measurably different emphases in the attention they give to given objects in their familiar environment. The American children do significantly better in "the number of concepts in drawing figure and ground" for "man" and "TV" but not for "house."(Are houses not so important to American inner-city children?). The American children do significantly better in "level of drawing a recognizable figure" of a TV set, but not of "man" or "house" (Are TV sets important to American inner-city children?) Israeli children do significantly better in "level of artistic performance in drawing" for the subject "house" but not for "man" or "radio." (Do Israeli disadvantaged children prize their houses?) The differences across the four tests which have comparisons to make over the three test items therefore appear to be more a function of differential cultural conditioning around test items than to be a function of differential kinds of abilities.

With data only on the one test item of "man," the two tests involving words show the American children to be significantly better; we do not know that the differences would be significant for other test items.

With respect to the Hypothesis D-2, that "for any given test and test item, no significant difference will show between the means of the scores for the two national groups," our conclusion is mainly confirmed, but with the acknowledgment that cultural differences do enter with respect to test items if not to test abilities, as such.

4) Hypothesis D-3a: data and interpretation

Hypothesis D-3a: For each national group, a significant positive correlation will show between IQ (Harris Draw-a-Man) and each test of drawing ability and related verbal ability. (See Table 40)

The hypothesis is confirmed. In the American group, 13 of the 14 correlations reached or exceeded .20, the floor for significance at .05; 12 correlations reached or exceeded .26, the floor for .01. In the Israeli group, all 14 correlations reached or exceeded the .05 level, and 13 of the 14 exceeded .32, the floor for significance at .001.

Israeli correlations were generally higher than American correlations; in 11 of the 14 entries, the differences were by at least 10 points. Dramatic differences show in the correlations having to do with words. On "number of concepts in words," American children did not reach significance levels; their correlation of .06 contrasts to the Israeli correlation of .39 which is significant at the .001 level. On "number of duplicate concepts," the American children achieved a correlation with IQ of .48; for the Israelis, the correlation with IQ was .70.

TABLE 40

Correlations: Harris Draw-a-Man (IQ) Test vs. Tests of Drawing Ability and Related Verbal Ability; Comparing National Groups

Tests	Harris Draw-a-Man (IQ) Test					
	American			Israeli		
	Man	House	TV	Man	House	Radio
Drawing Tests						
Level of drawing a recognizable figure	.60	.44	.25	.73	.48	.47
Number of concepts in drawing figure & ground	.53	.37	.30	.85	.47	.46
Level of cognitive performance in drawing	.60	.38	.30	.71	.48	.47
Level of artistic performance in drawing	.44	.32	.29	.58	.37	.21
Verbal Test						
Number of concepts in words for subject & setting	.06			.39		
Verbal-Drawing						
Number of duplicate concepts in drawing and words	.48			.70		

The evidence therefore indicates that the two national groups are alike in their tendency toward substantial and significant correlation between IQ as measured by the Draw-a-Man Test and tests relating to drawing capability, including duplicate concepts. They tend to differ, however, at two points: one, in the relation of verbal concepts to IQ, wherein the Israeli children have a significant and substantial correlation and American children do not, and two, in the general level of correlation between IQ and the measures used, wherein the Israeli children reach a higher level of relation by noticeable margins in a high proportion of the tests.

In speculating as to possible causes for these differences, two observations come quickly to mind in reference to differences in verbal activity. The disadvantaged preschool and elementary school child in Israel is in a school environment where constant talking is the norm in the classrooms and halls; the disadvantaged preschool and elementary school child in America is in a school environment where quiet is more the norm than talking, and where the children are generally expected to talk only when there is particular reason for it. In the Israeli home at the time the data was obtained (TV subsequently becoming generally available for 3 1/2 hrs. per day), the disadvantaged child had radio but not TV; radio emphasizes talking in support of a tendency toward talking as already present in the home. In the American home, the disadvantaged child has TV, which tends to divert attention from talking toward visualization (and toward passivity in response). Cultural conditioning in reference to the norm for verbalizing in the preschool situation and in the home may account for some of the differences between the two national groups in respect to word concepts related to IQ.

As to the difference in respect to levels of correlation between IQ and measures of drawing capability and related verbal ability, the higher performance of the Israeli children might, in some part, be explained by the same point, i.e., the greater exercise of verbalizing by the Israeli children. The IQ test, while based on drawing, is keyed for behaviors contributing to later school success where correlation with verbalizing ability would be essential. The higher correlation of the Israeli children with IQ may reflect this second order relation.

5) Hypothesis D-3b: data and interpretation

Hypothesis D-3b: For each national group, a significant positive correlation will show between age (in months) and each test of drawing ability and related verbal ability.

The hypothesis is confirmed. In the American group, 12 of the 14 correlations reached or exceeded .26, the floor for significance at .01. In the Israeli group, 11 of the 14 correlations reached or exceeded the same level. (See Table 41)

The two correlations not reaching levels of significance in the American group refer to "number of concepts in words" (.06), and

"number of duplicate concepts" (.17). For the Israeli group, these particular correlations were significant at substantial levels, .31 for "number of concepts in words," and .37 for "number of duplicate concepts." What has already been shown to occur with respect to verbalizing capability and IQ appears here, again, in relation to age: i.e., the American children do not show significant development with age in verbalizing ability while the Israeli children do.

TABLE 41

Correlations: Age (in mos.) vs. Tests of Drawing Ability and Related Verbal Ability; Comparing National Groups

Tests	Age in Months					
	American			Israeli		
	Man	House	TV	Man	House	Radio
Drawing Tests						
Lev. of dr. a recog. fig.	.45	.45	.48	.46	.54	.35
No. of con. in dr. fig. & grnd.	.30	.49	.47	.41	.48	.48
Lev. of cog. perf. in dr.	.40	.45	.49	.38	.46	.46
Lev. of art. perf. in dr.	.37	.36	.39	.20	.25	.13
Verbal Test						
No. of con. in wds. for subj. & set.	.06			.31		
Verbal-Drawing						
No. of dupl. con. in dr. & wds.	.17			.37		

On the measures of drawing capability, the two national groups correlate at close to the same levels in relation to age except on the measure of "level of artistic performance in drawing" where the Israeli group is 10 or more points lower on each of the three test items. This may reflect the six months differential in age between the two national groups, suggesting that the younger Israeli group shows its relative immaturity more in level of artistic performance than in level of cognitive performance. Apart from minimal cognitive form, artistic form has no way to show, and in that sense, is subject to prior cognitive development.

6) Hypothesis D-3c: data and interpretation

Hypothesis D-3c: For each national group, a significant difference will show between the means of the prekindergarten and kindergarten grades on each test of drawing ability and related verbal ability.

The hypothesis is confirmed. In the American group, kindergarten children performed at better levels than prekindergarten children in every measure, and at the .001 level of significance in 12 of the 14 means. In the Israeli group, kindergarten children performed at better levels than prekindergarten children in every measure, and at the .001 significance level in 12 of 14 means. (See Table 42)

The two instances in the American results which fell lower than the rest were concerned with words. For "number of concepts in words," the kindergarten children averaged 9.8 word concepts on "man" to an average for the prekindergarten children of 9.1; the difference in the means was not significant. For the Israeli children, however, the average for the kindergarten grade was 6.8 as compared to 5.3 for the prekindergarten grade; the difference was significant at the .01 level. This is another way of saying, again, that the American children do not seem to be developing in their verbalizing capacity with age, while the Israeli children do. On "duplicate concepts," the evidence of development in the American children is greater than exhibited for word concepts alone, the kindergarten children doing better than prekindergarten children at a significance level of .02. The difference for the Israeli children was again still more significant, i.e., at the .001 level.

TABLE 42

Means and t-Tests Comparing National Groups by Grade Level on Tests of Drawing Ability and Related Verbal Ability

Tests	Grade Level	American Man	American House	American TV	Israeli Man	Israeli House	Israeli Radio
Drawing Tests							
Level of drawing a recognizable figure	PreK	2.7	2.1	2.2	2.2	1.7	1.8
	Kdg.	3.4	3.0	2.9	3.1	3.0	2.5
	Sig. D.	.001	.001	.001	.001	.001	.001
Number of concepts in drawing figure and ground	PreK	7.2	2.0	1.9	4.0	.7	.7
	Kdg.	10.9	5.2	4.5	7.8	3.8	2.4
	Sig. D.	.001	.001	.001	.001	.001	.001
Level of cognitive performance in drawing	PreK	1.6	1.6	1.5	1.5	1.4	1.3
	Kdg.	2.7	2.7	2.6	2.5	2.8	2.2
	Sig. D.	.001	.001	.001	.001	.001	.001
Level of artistic performance in drawing	PreK	2.9	3.0	2.5	3.1	3.4	2.[illegible]
	Kdg.	3.7	4.1	3.5	3.7	4.5	[illegible]
	Sig. D.	.001	.001	.001	.001	.001	.02
Verbal Test							
Number of concepts in words for subject and setting	PreK	9.1			5.3		
	Kdg.	9.8			6.8		
	Sig. D.	N.S.			.01		
Verbal-Drawing							
Number of duplicate concepts in drawing and words	PreK	3.9			1.8		
	Kdg.	4.7			3.5		
	Sig. D.	.02			.001		

To summarize on the three hypotheses relating respectively to IQ, age, and grade as these correlate with measures of drawing and verbal ability, we have a recurring finding: on measures of drawing ability, the two national groups both show significant positive correlations; on the measure of the number of concepts in words, however, the American group shows non-significant correlation and the Israeli group shows significant correlation.

Drawing capability shows development in both national groups; verbal ability shows development in Israel but not in America.

We have offered such speculation as we can to explain the last finding, observing that norms of behavior appear to differ in the two cultures with respect to the amount of verbalization children do in the school and in the home, the Israeli children having the opportunity to exercise much more actively in their verbalization than is normal for American children. As elsewhere pointed out, cognitive development tends to occur in relation to the medium through which it is also expressed. With more opportunity for verbalization, the Israeli children appear to develop verbally with age, while the American children do not.

Summary on Hypothesis D: The two national groups tend to be alike in their response to measures of drawing ability and measures of ability to express concepts across media, i.e., in both drawing and words (duplicates); more specifically, in the following ways:

Both tend to generalize across subjects in their drawing, both in respect to cognitive ability and artistic ability (Hypotheses A-1 and A-2).

Both tend to develop cognitively in drawing as they develop artistically in drawing, and vice versa (Hypothesis B).

Both tend to develop cognitively in drawing as they develop cognitively across the two media of drawing and words (Hypothesis C-5a).

Both tend to develop artistically in drawing as they develop cognitively across the two media of drawing and words (Hypothesis C-5b).

Both tend to develop cognitively in words as they develop cognitively across the two media of drawing and words (Hypothesis C-5c).

Both tend to develop in abilities measured by IQ tests as they develop cognitively across the two media of drawing and words (Hypothesis C-6).

Both tend to develop in abilities measured by the Harris Draw-a-Man IQ Test as they develop in their drawing capability (Hypothesis D-3a).

Both tend to develop drawing capability as they mature in age (Hypothesis D-3b).

Both tend to develop drawing capability as they progress from pre-kindergarten to kindergarten (Hypothesis D-3c).

The two national groups tend to diverge on measures of verbal development. The Israeli group tends, but the American group does not tend:

to develop cognitively in words as they develop cognitively in drawing (Hypothesis C-3a)

to develop cognitively in words as they develop artistically in drawing (Hypothesis C-3b)

to develop cognitively in words as they develop in abilities measured by the Harris Draw-a-Man IQ Test (Hypothesis D-3a)

to develop cognitively in words as they mature in age (Hypothesis D-3b)

to develop cognitively in words as they progress from pre-kindergarten to kindergarten (Hypothesis D-3c)

In citing these findings on divergence, we need to make clear that they are based on correlations. On quantitative scores, the American children have more known names to use than do the Israeli children for the test item used in these comparisons; the American children average 9.6 word concepts for man while the Israeli children average 6.1, and the difference is significant. The point, rather, is that the verbalization which American children do seems not to feed into a developmental engagement, as is revealed by the disassociation of word concepts from measures of development as represented by IQ, age, grade, and drawing capability.

For teaching, this makes a difference in programs which would be most fitting in the two national settings. In America, a deliberate effort would need to be made to work on verbalization which is developmental; in Israel, the program can follow the assumptions, hypotheses, and designs as already formulated in this study.

Overall, the full set of assumptions and hypotheses, as originated for the experiment, worked out to fit for Israel; for America, a modification is needed where concepts in words becomes involved; otherwise, for America, the remaining assumptions and hypotheses also fit.

E. Concerning the Ability of Teachers of Preschool Disadvantaged Children to Make Essential Evaluations of Children's Drawings

1) Assumptions leading to hypotheses: We assume that teachers of preschool disadvantaged children are able to make evaluations of the drawings of their children which can make teaching programs, using drawing, effective in the development of the children.

At the present time, teachers of preschool children frequently feel themselves unable to make such evaluations, assuming that such judgments can properly be made only by those who have specialized in drawing as an art form, and more particularly, as an art form for children. Our assumption is that while drawing is an art form meriting specialized attention at all levels, children's and otherwise, it is being approached by preschool disadvantaged children at a level which lends itself to judgments which preschool teachers can make quite effectively, provided the teachers are aided by instruments they can use and can gain confidence in their evaluational abilities.

More particularly, our assumption is that the teachers can quickly learn to use a rating scale for judging the level a child reaches in drawing a recognizable figure of a given subject, and can readily count the number of concepts (number of different recognizable forms) which a child includes in his drawing of a given subject and its setting. Granted these simple measures, the teacher can diagnose the level at which a child is performing in his drawing, and can obtain cues as to the next efforts the child might be supported in making to bring his accomplishment to a higher level as he continues in his drawing activity.

We are assuming that as a child draws, he is not only doing something of immediate intrinsic value to himself but he is also offering to others a message as to what he knows and is able to do; he is saying something to others, which when accepted as a communication, can become an avenue of exchange and mutual interest between "significant others" (including the teacher) and himself. A child can communicate "house" by drawing it, well before he is able to communicate "house" by spelling it; houses are shared by adults and children, and a drawing of a house by a child is a form of his saying he is coming to learn what is shared between himself and others; it is a way of saying he knows a mutual belonging. Accepted in this spirit, the teacher can "intervene" to make possible an even richer sharing.

Drawing, taken as a form of communicating knowings and doings, is therefore a suitable ground on which teachers of disadvantaged preschool children can approach the drawings they evaluate. It is probably true that drawing, as an art form at its highest level of rendition, is still a form of communication. Whether or not it is successful as art is a function of whether it is successful in communicating qualities of experience from its originator to others. This being the case, there should be no basic discontinuity between what the teachers do in using the simple schema provided for evaluating the drawings in the framework of communication, and what art educators, using more sophisticated and detailed evaluations based on their background in art, produce as their evaluations of the same drawings.

Assuming evaluation of disadvantaged preschool children's drawings to be essential to the effective use of drawing for the development of the children, and assuming that, when supplied with suitable instruments, the classroom teachers of these children can make those evaluations at levels comparable to evaluations of the same drawings by art educators more experienced in evaluating such drawings, we hypothesize that a significant positive correlation will show between the measures performed by the teachers (Level of Drawing a Recognizable Figure, and Number of Concepts in Drawing Figure and Ground) and the measures performed by art educators (Level of Cognitive Performance in Drawing, and Level of Artistic Performance in Drawing).

2) Hypothesis E: data and interpretation

Hypothesis E: Given a set of drawings made by preschool disadvantaged children, tests of those drawings as made by preschool teachers

will show significant positive correlation with tests made by art educators experienced in children's drawings; i.e., each of Level of Drawing a Recognizable Figure and Number of Concepts in Drawing Figure and Ground (both scored by preschool teachers) will show scores having a significant positive correlation with scores on Level of Cognitive Performance in Drawing, and Level of Artistic Performance in Drawing (both scored by art educators).

TABLE 43

Correlations:* Two Preschool Teachers' Tests vs. Two Art Teachers' Tests: Total Pool of Cases

A. Preschool Teachers' Test: Level of Drawing a Recognizable Figure

Tests by art educators	Items	Level of drawing a recognizable figure Man	Tree	House	TV(radio)
Level of cognitive performance in drawing		.52	.52	.60	.53
Level of artistic performance in drawing		.39	.33	.38	.38

B. Preschool Teachers' Test: Number of Concepts in Drawing Figure and Ground

Tests by art educators	Items	Number of concepts in drawing figure and ground Man	Tree	House	TV(radio)
Level of cognitive performance in drawing		.45	.38	.58	.48
Level of artistic performance in drawing		.34	.33	.43	.40

*All correlations reported in these tables are means of correlations between the scores made on the test item listed in the heading and the scores made on the tests scored by art educators for the test items man, tree, house, TV(radio), and combination.

This hypothesis is confirmed. All the correlations are above .32, the floor for significance at the .001 level.

We interpret this data to be evidence that preschool teachers, using their own tests and making their own judgments of drawing, can expect the main trend of their evaluation of drawings to be in line with the main trend of the evaluations given by art educationrs (who used more refined instruments and had greater experience with children's drawings). Though the tests made by preschool teachers emphasized the cognitive aspect of drawing and correlations were relatively high with the cognitive test made by an art educator, the correlation of the preschool teachers' tests with artistic performance in drawing made by an art educator was also substantial. In other words, preschool teachers can assume that their judgments are taking into account artistically-relevant aspects of drawing even though the emphasis they consciously put on the drawings is cognitive.

Summary Interpretations (Hypotheses A through E)

1. The evidence indicates that preschool disadvantaged children have a "generalized drawing capability"--by which we mean to infer that they have a beginning discipline to bring to their learning. They apparently have a sense for the process of drawing, as process, and they enjoy involvement in the experiencing of themselves operating that process; they therefore "generalize," i.e., they tend to try to draw each subject at the level they know they can draw when satisfaction with the process is greatest. The assumption seems appropriate that young humans gain a satisfaction from making forms with their hands that fit to forms their eyes recognize as pertaining to the formation of the visible world. The process of creating such fitting between one's own doings and the doings of the world seems intrinsically satisfying, leading to the willingness and desire of children to exercise the drawing process. Drawing is therefore a medium advantageous to use when the aim is to lead children to develop their knowledge of their world.

2. The evidence indicates that disadvantaged preschool children exercise two interrelated abilities in their drawing; one a cognitive ability to recognize forms existing in their environment or in their drawing (noun), and the other an affective ability to recognize themselves as actors affecting the world by what they can do in their drawing (verb). The capacity to affect the world by forming a drawing in it is invitation to differentiate the environmental forms to which forms in the drawing can refer, and vice versa, the capacity to differentiate forms known to be in the environment is invitation to integrate those forms into the known-and-expressed within a drawing. Development of the child, generally, involves his better relating himself to the world, and better relating the world to himself. Drawing is a medium which exercises the transaction in both directions and in interrelation. The cognitive and affective are intertwined necessities in the development of the child, and are both called upon with an inter-fitting during

the development of a drawing, the development of drawing capability, and the development of the child, generally. The evidence indicates that disadvantaged preschool children are already exercising cognitive and affective abilities in interrelation in such drawings as they can do.

3. The evidence indicates that preschool disadvantaged children may develop a generalized drawing capability apart from development of a generalized verbalizing capability. Whereas the American children were able to conceptualize across subjects in drawing, and reach significance levels of correlation, they were not able to conceptualize across subjects in words and reach significance levels.

Apparently, children do not develop conceptualization in general; rather, they tend to develop conceptualizing capacity within the framework of the outlets available to them for expression. In drawing, they appear able to sense the process of drawing as a process; this gives them the power to take one subject-to-be-known after another as though each, in turn, were to be handled within that process. This enables generalization across subjects. In verbalizing, they were not yet able to sense a process by which to deal with one subject after another; their verbal concepts were still subject-bound. Under these circumstances, correlations of significance for the American children did not appear across subjects in verbalizing, nor did they appear between performance in drawing tests and conceptualization in words.

This affirms that the development of cognitive ability is related to the media of expression, with differential rates for the different media.

This is implied, also, in the data on "duplicates," i.e., on the same concepts expressed in the two media, drawing and words. The level at which the children did duplicates tended also to be the level at which they performed in either drawing or words. The ability to do duplicates tends to generalize across subjects, meaning that the ability to generalize across media tends to mean the ability, also, to generalize within either medium.

It should be noted, however, that the correlations, while relatively substantial for the relation between duplicates and drawing, were relatively weak for the relation between duplicates and words. This is inference, again, that these children are better equipped to generate growth in themselves through the use of drawing than through the use of words, though, obviously, it is also true that the ability to express concepts both ways is even better--indicating, as it does, a wider growth potential.

The fact that significant correlations showed for relations between duplicates and IQ tests would seem to affirm the value for subsequent school success of an ability to conceptualize across media.

4. The evidence indicates that disadvantaged preschool children in the two national groups tend to respond in similar ways to tests of drawing ability and tests of ability to express concepts in both drawing and words, but that they tend to diverge on tests of verbal development. More specifically, in respect to similarities, they tend to generalize across subjects in drawing; to associate cognitive and artistic abilities in

drawing; to associate drawing ability with abilities measured by the Harris Draw-a-Man IQ test, with maturity in age, and with progress in grade level; and to associate an ability to express the same concepts in the two media of drawing and words with ability in either medium, and with abilities measured by IQ tests.

In respect to divergence, they tend to differ in that the Israeli children associate cognitive development in words with development in drawing, with Harris Draw-a-Man IQ, with maturity in age, and with progress in grade level while the American children do not associate cognitive development in words with development in drawing, with Harris Draw-a-Man IQ, with maturity in age, or with progress in grade level.

Overall, the similarities are much more extensive than the differences; the similarities support the assumption that a teaching program which would succeed in developing disadvantaged preschool children in either setting would be a good candidate to prospectively succeed in the other. The differences warn, however, that it is better to know the specifics than to be left to the mercy of assumption alone. The differences suggest, in this instance, that American teachers have a problem which Israeli teachers do not have so acutely, i.e., that of getting children's talk to become functionally relevant to cognitive development, both in a verbalizing medium and in relation to visual media. The American setting seems to separate the visual from the verbal in a way the Israeli setting does not, meaning that teaching of the American children needs to be directed more pointedly at a developmental integration of the two than would be necessary in the Israeli setting.

5. The evidence indicates that teachers of preschool disadvantaged children are quite capable of evaluating the drawings of their children as these evaluations are needed in a program of fostering cognitive development through drawing. Preschool teachers can judge cognitive content in the drawings by relatively simple techniques, i.e., by assigning to be drawn a familiar subject in the child's environment, by then judging the level of the child's ability in drawing a recognizable form of that subject, and/or by counting the number of sub-features of the subject the child has been able to include at a recognizable level. By use of these measures, preschool teachers can make judgments of cognitive content which correlate well with either "level of cognitive performance" or "level of artistic performance" as either of these judgments are made by art educators experienced in judging the drawings of children.

Preschool disadvantaged children are just beginning to learn to draw; what the children need is some way of knowing what they are accomplishing; they need confirmation of the value of their efforts; they need to know what is good about what they have done and what would be better if they could do it in their next drawing; they need to communicate to others, to say something having meaning and value; they need their messages to be "read." Preschool teachers can meet these needs; they have the capacity. And the children have the chance to learn something of inestimable value: What "learning" feels like and what the conditions are that make the learning experience possible, satisfying to self and to others. On this, development in school and in the modernizing society depends.

PART III - THE EXPERIMENT

This part of the report focuses on the five teaching methods and their effects as measured by pre-post gains of the children on a battery of ten tests.

For orientation to the directions of our inquiry while conducting the experimental teaching, we first list our main questions; these are the content of Chapter VI, captioned "The Leading Questions."

We next report on operations essential to research on the effects of the experimental teaching methods: sampling procedures and data; assessment procedures; the battery of tests and the characteristics of four tests, added to those used in the diagnostic study and re-used as post-tests; and the statistical operations for comparing the teaching groups. These topics are the content of Chapter VII, captioned "The Research Operations."

With the data available, we then discuss the assumptions leading to the hypotheses with which we approach the organization of the data, explicitly state the hypotheses, present the data, interpret the results, and summarize the interpretations. These are the content of Chapter VIII, captioned "Hypotheses: Derivation, Data and Interpretation."

CHAPTER VI
THE LEADING QUESTIONS

The questions guiding inquiry into the effects of the teaching methods are as follows:

(1) Do preschool disadvantaged children develop cognitive drawing ability, artistic drawing ability, and related verbal ability when taught by traditional methods of using drawing in preschools? Can these abilities be developed by methods designed to help the teacher intervene in specific ways to support the children in their development of these abilities?

(2) Which methods of intervention prove most productive of gains: those which are relatively narrow in the range of kinds of differentiation they employ, having then more time to emphasize each, or those which are relatively wide in the range of kinds of differentiation they employ, having then less time for each but more chance for inter-support among the kinds? For example, will Discussion (with one kind of differentiation, i.e., verbal) produce more gain, or will Touch (with several kinds of differentiation, i.e., verbal, visual, tactile, kinesthetic) produce more gain?

(3) Which methods are most successful in enabling preschool disadvantaged children to "generalize," i.e., to "transfer the learning" from items taught to items not taught? Which methods produce the most gain in cognitive ability, artistic ability, and related verbal ability on items not taught?

(4) As between the two grade levels of prekindergarten and kindergarten, which age group of disadvantaged children makes the greater gain in their cognitive drawing ability, artistic drawing ability, and related verbal ability? (a) Is it the prekindergarten children because they begin from relatively lower levels, or is it the kindergarten children because they have already developed more threshold abilities and have more with which to work? (b) Should differences appear by grade, do they appear uniformly for all three abilities tested, or do they appear differentially according to the ability tested? (c) Similarly, should difference appear by grade, do they appear uniformly for all teaching methods or do they appear differentially according to the teaching method used?

(5) How do the two national groups compare in their responses to the teaching methods? Where the response is different, why?

CHAPTER VII
THE RESEARCH OPERATIONS

A. The Sampling and Testing Procedure

1) The sample: The research sample included nine groups of children randomly selected from a list of all children that studied in all the prekindergarten and kindergarten classrooms in nine culturally disadvantaged areas in America and Israel; five groups in five disadvantaged areas in Columbus, Ohio, and four groups in four disadvantaged areas in Tel-Aviv. The nine groups included a total of 450 prekindergarten and kindergarten children: five American groups, including a total of 262 children, and four Israeli groups, including a total of 188 children.

Each area was randomly assigned to one out of five treatment methods, and in all classrooms in that area, only that one method of treatment was used, being applied to both the prekindergarten and kindergarten levels. All children in a given classroom were taught by a given method; the teacher did not know either before or during the experiment which of the children in a classroom had been selected for the research sample.

Table 44 summarizes the number of cases by national group, teaching group and grade level of the children.

2) Tests and test items: The children in the research sample were tested before and after treatment on the Harris-Goodenough Draw-a-Man Test and on six additional tests, devised for this study and described in Chapter IV. The same tests and testing procedures were used in both countries, but, following on the Israeli experience, we were able to increase the number of test items used in the newly devised tests when these tests were given to the American children. Table 45 lists the six tests and the test items as used in the two countries.

When, in the next chapter, comparisons are made of results from the two national groups, the test items used for the American sample are the same as the test items available from the Israeli sample; when reports are made on one national group, independent of the other, the full range of test items available to that national group is used, the range of test items being greater for the American than for the Israeli research samples.

TABLE 44

Composition of the Research Sample
for the Teaching Groups

National groups and grade level	Con-trol	Dis-cussion	Obser-vation	Touch	Tech-nique	Total
American						
Prekindergarten	29	26	23	24	26	128
Kindergarten	28	28	27	21	30	134
Total	57	54	50	45	56	262
Israeli						
Prekindergarten	24	25	19	22		90
Kindergarten	23	20	29	26		98
Total	47	45	48	48		188
Total sample						
Prekindergarten	53	51	42	46	26	218
Kindergarten	51	48	56	47	30	232
Total	104	99	98	93	56	450

TABLE 45

Tests and Test Items Used in Pre-Post Testing;
National Groups Compared

Tests and national groups	Test Items: Man	House	TV set for Amer.; radio set for Israel	Tree	Comb.: man + house + tree
Level of drawing a recognizable figure					
American	+	+	+	+	-
Israeli	+	+	+	-	-
Number of concepts in drawing figure and ground					
American	+	+	+	+	+
Israeli	+	+	+	-	-
Level of cognitive performance in drawing					
American	+	+	+	+	+
Israeli	+	+	+	-	-
Level of artistic performance in drawing					
American	+	+	+	+	+
Israeli	+	+	+	-	-
Number of concepts in words for subject & setting					
American	+	+	+	+	-
Israeli	+	-	-	-	-
Number of duplicate concepts in drawing & words					
American	+	+	+	+	-
Israeli	+	-	-	-	-

3) Testing procedures in pre-post testing of the Israeli sample: The testing procedures before and after treatment were identical. In the presence of a research assistant, all the children in each classroom were asked by their teachers to make three drawings, one per day, for each of the following subjects: man, house, a radio set.

Each teacher instructed her children as follows: "Here you have paper, pencils and erasers. Please draw for me a man. Try to make it the very best man you can." When a child stopped drawing, he was encouraged, one time only, by the teacher or the research assistant (present in the classroom at the time of testing) in the following manner." "You are drawing very nicely. Are you finished or would you like to try some more and draw the very best man you can"? Each child was given as much time as he wanted.

When a child said he had finished his drawing, he was asked by the teacher or research assistant: "Tell me, what did you draw"?, and whatever the child said was written down by the teacher or by the research assistant on the back of the drawing. The child's name was also written on the back of the drawing.

Using the same procedures, the children were asked on the next day to do a drawing of a house, and on the following day, to do a drawing of a radio set.

In the 32 classrooms, there were 976 children; we then had 976 drawings of each of the three test items. Without the knowledge of the classroom teachers as to whose drawings were selected for the research sample, the researcher selected (by names on the back) the 188 drawings of each test item for the randomly selected sample.

After the drawings were done, the research assistants tested each of the 188 selected children individually on their verbalization with respect to the subject " " The child was asked to "tell me all a man has, everything a ma ." When the child stopped talking, he was encouraged to say mo in the following manner: "Very nice. Now tell me some more things you can think of that a man has." This was done but once for each child. The child's verbalized concepts of features of a "man" were recorded.

4) Testing procedures in pre-post testing of the American sample: The procedure which was followed in obtaining the test drawings and verbal records for the Israeli children were replicated for the American children; the instructions to the children were the same, the roles of the teachers and research assistants were the same, the interval of one day for each test drawing was the same. Since, however, we included more test items in the American experiment, the procedures were extended in time to include the test items of tree and "combination" (man + house + tree) for the drawing tests, and house, TV set and tree for the verbal tests.

In the 20 American classrooms, there were 525 children; we then had 525 drawings of each of the five test items. Without the knowledge of the classroom teachers as to whose drawings were selected for the research sample, the researcher withdrew the drawings of the random sample of 262 children. After the drawings were done, the research assistants tested each of the 262 selected children individually on their verbalization with respect to the subjects of "man," "house," "tree," and "TV," (these tests being given one day apart for each subject), following the same instructions as had been used for the Israeli group, and recording the verbal concepts for each test item in the same manner.

B. The Experimental Design

1) Development of the experimental design: The experimental design was developed in two stages: the first in Israel, the second in America. In the first stage, the focus was on the development of three experimental methods of teaching drawing; the "discussion method," the "observation method," and the "touch method." Groups of disadvantaged preschool children included in the Israeli research sample were taught by these methods, and subsequently, groups of disadvantaged preschool children in the American research sample were taught by the same methods, though with a modification in the "touch method" to separate out elements which, in the American operation, came to be differentiated into the "touch method," and the "technique method." The American operation then had four experimental methods in addition to Control, while Israel had three in addition to Control. Teachers were trained by Dr. Smilansky in America as they had been trained in Israel.

After the experimental teaching was completed in America, all the tests given to both American and Israeli children before and after the experimental teaching were scored by one team (including preschool teachers, art teachers experienced in young children's drawings, and research assistants) trained for that purpose. The use of one team better assured the comparability of results as between the two national groups.

In Table 46 are listed the experimental teaching methods used in America and in Israel.

TABLE 46

Comparison of Experimental Teaching Methods
Used with the Two National Groups

Experimental Teaching Methods	Israeli Research Sample	American Research Sample
Control group (the traditional method used at present in most preschools	+	+
Discussion group	+	+
Observation group	+	+
Touch group	+	+
Technique group	-	+

2) Major differences between the experimental methods of teaching and the Control group (the traditional method of teaching drawing): In the Control group, which is the traditional method of teaching drawing, the teachers offer the children specified times for drawing, plenty of materials and ready support for each child for the drawing he does. There is no intentional effort on the part of the teacher to intervene (1) in the choice the child makes of what he wants to draw, (2) in preparing the children in advance of their activity in drawing, (3) in interceding in the activity of the children while they are at work in their drawing, or (4) in analysis of completed drawings from the point of view of helping the child to do better in his succeeding attempts to draw given subjects. The aim of the teacher, according to the traditional method, is to encourage the children to draw but to carefully refrain from intervening in the child's activity on the ground that the child needs freedom for his own unfettered expression.

As in the traditional method, the teachers of the experimental groups offer the children the allotted time for drawing, plenty of materials for drawing, and affective support for each child in the work he does in drawing. In contrast with the traditional method, however, the teachers of all the experimental groups (1) suggest for each session a leading theme for drawing, (2) prepare the children for work on the theme by taking them through specified activities (different for each experimental procedure) prior to their beginning to draw, (3) intercede in the activity of each child while he is at work in his drawing (using procedures specified for each method), (4) discussing with each child

his completed drawing, pointing especially to what he has revealed as features he knows and to additional features he might include in his subsequent drawings to show his knowing of more.

3) Description of the teaching procedures for the four experimental teaching groups: Each experimental teaching group had a specified procedure, as follows:

The Discussion Method: Experimental Group I: As a subject for drawing is introduced, the teacher leads the students into a discussion of its varied features. The aim is to get the children thinking about the characteristics of the subject they are to draw by focusing attention on what they remember about the subject from their own experience with it. While drawing, the children work from memory and from visualization of the remembered. As each child draws, the teacher observes what the child is doing, supports him in his trials, and discusses with him added features he might include. After a drawing is completed, discussion is again used by the teacher to specifically point to what the child may have included that is new, compared to his past drawings, and also to what, if included in his subsequent drawings, might add still more to his self-realized accomplishment.

The Observation Method: Experimental Group II: In addition to discussion, this method uses observation of a model of the subject which is brought into the classroom for the children to inspect. Also, if possible, the children go outside to observe. At the opening of the period, the discussion, as in Experimental Group I, is on the subject as remembered by the children. The actual subject or a model of it is then introduced, and the children are led into further discussion as their attention is directed to features of the model they see. The model is left in position where it can be seen by the children while they draw. The aim is to get the children thinking about the characteristics of the subject by focusing their attention on what they now see in the model as compared with what they remember from their past experience. The process of referring to visual features of the model is repeated when aiding each child with his own drawing, and again, at the close of the period when consideration is given to gains the child may have been able to make, and to what the child might further include in his drawing when next undertaking to draw the same subject.

The Touch Method: Experimental Group III: In addition to discussion and observation, as introduced in Experimental Groups I and II, this method affords the children an opportunity to touch and to handle the models which, in this group, are smaller models that are placed at close range on the table where the children are working. Throughout the drawing session, the models are available within touchable reach of the children. The aim is to augment the remembered perception and the visual perception with close visual impact, combined with tactile and kinesthetic sensation. After discussion, the children touch and handle a model while looking it over, prior to drawing. During drawing, aid is given each child by helping him refer again to the model immediately

before him and touch it for suggestions of features that might be included, the process being repeated again at the close of his drawing, when the teacher supports the child for the gains he has made and helps him to see what he might further include in his subsequent work on the same subject.

This is the prescription followed for the Touch group in the American setting. In Israel, the Touch group also included some technical help to the children, i.e., children were helped to learn to draw standard kinds of forms (rectangles, squares, triangles, circles) when those kinds of forms were characteristic of an object to be drawn, and when the children, in individual cases, would seem to need and be able to use such aid. Similar help was given individual children in improving their drawing of lines, and in making shading to distinguish dark and light areas. Help on techniques was not taught systematically to the whole class, nor in a systematic way as it was later done in the American experimental group bearing the label, Technique method. It was the ambiguity of the Touch method in Israel (from the research point of view) that led to the more clear cut division into the two methods of Touch and Technique, as defined and portrayed here, and as used in America.

The Technique Method: Experimental Group IV: Recognizing that problems in drawing may derive not only from lack of knowing about the subject but also from lack of knowing how to draw to show what one knows about the subject, this method seeks to also help the child with technical skills. In addition to discussion and observation, as these are employed in Experimental Group II (the models exposed at a distance), the children are each given a packet of forms cut out of stiff paper: rectangles (six sizes and colors), squares (three sizes and colors), triangles (three sizes and colors), and circles (four sizes and colors). With these forms at hand and identified, the teacher helps the children select shapes which, when put together suitably, can approximate the way a given object looks. Discussion and observation are focused on the forms at hand and on the correlative forms appearing in the objects to be drawn. The subsequent drawing of that object can then be a matter of learning to make the appropriate shapes. Since the kinds of shapes are recurrent from object to object, learning to draw standard forms becomes a way of learning to draw one subject after another. As the children are learning to use shapes, they are also taught to improve their making of lines, and to use shading to indicate dark and light areas. In individual cases, where children show the need and the capacity, they are helped with perspective and other techniques. When helping the individual child during his drawing, and when reviewing his drawing on its completion, the teacher employs discussion and observation not only in reference to the objects used as subjects for drawing, but also in reference to technical aspects of drawing.

4) Preparation and support of the teachers: The project was initiated in a three-stage development; first, through meetings with administrators to get their full understanding, approval, and support; second, through workshops with the supervisors who had responsibility

for developing the teaching programs in the affected schools; and third, through workshops with the teachers who were to do the teaching.

The workshop for the supervisors was five days in duration, six hours per day. The first day, the total group met as a unit. The agenda included the following main points: cognitive development as essential to the later success of disadvantaged children in school; the background of conditions affecting the cognitive development of disadvantaged preschool children; the conditions which were essential in preschools if disadvantaged children were to develop their cognitive abilities; the potentialities of drawing as a medium for generating cognitive development; the stages of development in drawing ability as these relate to the cognitive development of children; cues to use in diagnosing a child's progress in drawing and in determining the kind of aid he then needs; the conditions to be fulfilled in order that the data obtained from experimentation have value; the tests to be used; the proposed schedule of operations; and the goals and plans for the workshops to be held for the teachers. During the four remaining days of the workshop for supervisors, sub-groups were formed for each teaching method, and attention was focused on an understanding in depth of each teaching method.

To avoid cross contamination of teaching methods, and to assure clarity of focus for each teaching treatment, only one kind of treatment was used in a given geographical area. A workshop was then conducted for the participating teachers in that area. This meant five separate workshops in the American setting, and four separate workshops in the Israeli setting, each devoted to the particular method of teaching in that area.

Each workshop was of five days duration, six hours per day. These were conducted by the supervisors in that area, along with the researcher. The topics were similar to those listed above for the workshop previously held for the supervisors, but with particular emphasis on the benefits to be derived from experimentation, the particular strengths of the given method to be used, and the cues to follow in helping the children. The aim was to generate interest in, enthusiasm for, and competence in the given method. A workshop was held for the teachers of the Control group, as well as for the teachers of each of the experimental groups. The intent was to assure that each method had the positive benefit of the Hawthorne effect, and, thereby, to do what we could to negate its negative effects as a potential differential in the results obtained from the varied methods.

After the teaching programs had begun, contact was maintained with the teachers in each area (including the teachers of the Control groups) through meetings of three to four hours per week with each group of teachers. These were led by the respective supervisors, accompanied by the researcher. Plans were discussed for each week, methods of teaching were demonstrated, and the questions of the teachers were answered. The first part of each meeting was held with the group as a whole, the second part was held with the kindergarten and prekindergarten teachers separately, and the third part, usually two hours in length, was reserved for work with individual teachers on their specific interests and problems.

While teaching was underway, personal visits were made to each classroom by the relevant supervisor, often accompanied by the researcher, to assure that the procedures were being followed and to encourage the teachers and teaching assistants in the work they were doing. These visits were made to the teachers of the Control group as well as to the teachers of the experimental groups.

5) Duration of the teaching program: For each treatment, the program of teaching extended over 10 weeks, with three one-half hour sessions per week.

6) The themes used in teaching drawing in the experimental groups: The themes for all the experimental groups were the same, and were used in the same sequential order. They were chosen as subjects commonly appearing in the drawings of preschool children. Each theme was assigned for one week. In each successive week, the children were encouraged to include the new theme as offering subject matter additional to what they had already been using in their drawings; hence the themes were cumulative rather than separated for a single week's treatment.

Listed, the themes were as follow:

Week 1: a man, e.g., a boy, girl, doll, father, mother

Week 2: a tree; varied types possible

Week 3: a vehicle, e.g., a car, bus, train, plane, bicycle

Week 4: a fence around trees

Week 5: drawings that combine the above themes

Week 6: table near the trees

Week 7: fruits, e.g., apples, bananas, grapes

Week 8: containers of fruit, e.g., dishes, bowls or baskets of fruit

Week 9: drawings that combine the themes of the sixth, seventh, and eighth weeks

Week 10: drawings that combine all the above themes

Excluded from the above list were two items which were used in the research design for testing of gains on "not taught" items, i.e., the items of house and TV set (radio set for Israel). These not taught items served as a test of the capacity of each teaching method to produce gains by transfer from items taught to items not taught. The

subject of house was used as a common theme for preschool children, and the subject of TV set (or radio set) was used as an uncommon theme thought to offer a more stringent test of transfer ability of learning. The Control group was not assigned any themes to teach or not teach, offering a clear contrast to the experimental methods in connection with the "transfer" problem.

In a given teaching session, as a child finished with a drawing which included the assigned theme of that week, he would be encouraged to elaborate on it by adding further features, or, if he wished, to draw something else until the end of the half-hour period. The teacher intervened in a child's work only in relation to the drawing he did under the assigned theme; otherwise the teacher did not intervene. The children were thus expected to do their assignments, but they were also to know that other drawings would be welcomed and considered important in the eyes of the teacher.

7) Sub-groupings in the classrooms: To facilitate teaching which was relevant to the ability levels of the children, sub-groups of four or five children were formed with a teacher (regular teacher, assistant teacher, or student teachers, all trained in the procedure) assigned to each sub-group. The units were formed by ability levels in drawing at the beginning of the teaching program, with freedom granted to alter the composition of the groups if need arose because of social or behavioral problems.

Children in the lower ability levels of drawing were held to work primarily on the assigned themes, without emphasis on cumulating composition; the important point, in their case, was to develop threshold levels of recognizability of the forms they found in those themes.

C. Derivation of the Sample

Our sampling procedure moved through three stages, as follow:

1) First stage: selection of areas: We received from the Ministry of Education in Israel a list of the areas in Tel-Aviv in which preschool and elementary classrooms in the areas were identified as meeting the criteria of "enrolling culturally disadvantaged children." From this list, we selected four areas, each area including eight preschool classrooms (four prekindergarten and four kindergarten). We received from the Columbus Public Schools a list of the areas in Columbus in which prekindergarten and kindergarten classrooms were found in Title I schools, i.e., enrolling culturally disadvantaged children. From this list, we selected five areas, each area including four classrooms.

2) Second stage: random selection of children: From each of the nine areas (four in Tel-Aviv and five in Columbus), we received a list of names of children enrolled in the prekindergarten and kindergarten classes. From this list, we randomly selected 50 children in Israel, and 60 children in America, half the children in each case being prekindergarten children and half being kindergarten children.

3) Third stage: random assignment of teaching treatments: In Tel-Aviv, and again in Columbus, one supervisor was invited from each of the chosen areas to a meeting. The name of each teaching method was placed on a slip of paper; each slip was then put into its own unidentified envelope; the envelopes were put in a box, and each supervisor took one envelope by lot. In this manner, four teaching methods were randomly assigned to the four areas in Tel-Aviv, and five teaching methods were randomly assigned to the five areas in Columbus.

Table 47 shows the number of cases in each teaching method for each of the two countries.

TABLE 47

The Number of Cases in the Sample for Testing the Teaching Methods

Areas assigned / Location and grade level	#1 Control group	#2 Discussion group	#3 Observation group	#4 Touch group	#5 Technique group
Columbus, Ohio					
Prekindergarten	29	26	23	24	26
Kindergarten	28	28	27	21	30
Total	57	54	50	45	56
Tel-Aviv, Israel					
Prekindergarten	24	25	19	22	
Kindergarten	23	20	29	26	
Total	47	45	48	48	

D. Assessment Procedure

The six tests especially designed for this project, and used in the pre-tests to provide data for the diagnostic study (Part II of this report), were also used in the post-tests to provide data on gains which had been achieved by each of the teaching groups. The children provided the post-test data by drawings and oral reports done a week after the teaching program had been completed. (For a full discussion of these six tests, see Chapter IV). To obtain a "change" or "gains" scores from these tests, a research assistant subtracted a child's pre-test score from his post-test score on a given test and test item, posting the result as a separate entry for data processing.

In addition to the six tests used in this pre-post fashion, four tests were created to measure change both more in detail (two of the tests) and more globally (two of the tests). For the more detailed tests, art teachers defined sub-criteria for the two areas of drawing ability: cognitive and artistic. Ten dimensions were stipulated for cognitive ability, and a rating blank was accordingly created for the 10 sub-scales. Eight dimensions were stipulated for artistic ability, and a rating blank was accordingly created for eight sub-scales.

One art teacher then used the 10 cognitive sub-scales to rate change in each pre-post pair of a child's drawings. A single score for a child was derived by summing the 10 ratings for each pair, and then adding these sums for all of a child's pairs of drawings. Another art teacher used the eight artistic sub-scales to rate change in the set of a child's pre-test drawings against the set of his post-test drawings, deriving a single score for a child by then adding the eight ratings thus made.

For the more global tests, one art teacher rated on one scale the change he saw in cognitive ability when viewing a set of a child's pre-test drawings against a set of his post-test drawings, while another art teacher did a similar rating, in a similar way, for change in a child's artistic ability.

The drawings were appropriately shuffled (i.e., by pairs in one test, and by pairs of sets in three tests), each time they were rated in order to minimize identification or prediction of classification by grade level, treatment group, sex or name.

In the following table are given the titles of the tests used in the battery for assessing the effectiveness of the teaching methods; the first six are the pre-post tests also used for the diagnostic study; the next four are the added tests. The table shows who scored each test, who derived the "change" score, and how the drawings were presented for judgment, i.e., in random order with respect to their being a pre-test drawing or a post-test drawing, or in paired order by subject or by set, with each drawing or set identified as pre or post.

Following the table is a description of each of the four added tests.

TABLE 48

Tests Used in Comparing Productiveness of the Teaching Methods

Tests used to derive change (gains) scores	Items scored by	Change score derived by	Pre-post items in random order; shuffled	Pre-post items in paired order; shuffled
1. Level of drawing a recognizable figure	preschool teacher	research assistant	+	-
2. Number of concepts in drawing figure and ground	preschool teacher	research assistant	+	-
3. Level of cognitive performance in drawing	art teacher	research assistant	+	-
4. Level of artistic performance in drawing	art teacher	research assistant	+	-
5. Number of concepts in words for subject and setting	research assistant	research assistant	+	-
6. Number of duplicate concepts in drawing and words	research assistant	research assistant	+	-
7. Sum of changes in 10 cognitive sub-scales	art teacher	art teacher	-	+
8. Level of overall cognitive performance in drawing	art teacher	art teacher	-	+
9. Sum of changes in eight artistic sub-scales	art teacher	art teacher	-	+
10. Level of overall artistic performance in drawing	art teacher	art teacher	-	+
11. Harris-Goodenough IQ Test	psychologist	research assistant	+	-

E. Scoring Procedure for the Four Added Tests

1) Sum of changes in 10 cognitive sub-scales: Each child's pre-test drawing of a given subject was compared to his post-test drawing of that subject, and a rating was made on the change which was evident in respect to each of 10 dimensions of cognitive ability, as follows:

(1) change in the number of features (concepts) included in the primary figure

(2) change in the number of features (concepts) included in the background of the primary figure

(3) change in the location of the primary figure to give it a better "placement" on the paper (not in a corner or at an edge, but more centrally) and a better "placement" substantively (e.g., house is drawn with a base line implying location on the earth, not left floating in air)

(4) change in "texture" to better display the substantive quality of the object, e.g., not merely outlined but filled in with internal features

(5) change in "shadowing" to show a better awareness of the visual effect produced on objects by light coming from a given source

(6) change in "perspective" to show a better awareness of the visual properties of objects in receding space when seen from a given point of view

(7) change in "proportion" of drawn forms to better show the relative size of given features with respect to other features

(8) change in "size" of drawn forms when size is interpreted as an index of the child's confidence in his drawing ability, e.g., change from small, cramped figures toward larger, more generous figures

(9) change in "settings" provided for objects to show a better awareness of the situation in which they actually occur, e.g., a TV set shown not on a lawn but in a house

(10) change in "expression" to show a more personal and individual statement and less use of stereotypes

On each of the ten dimensions, scoring was done on the same scale, i.e., from a +3 to a -2, as follows:

"+3" for a striking gain in both qualitative and quantitative ways

"+2" for a significant gain, mostly quantitative

"+1" for a slight gain, e.g., new features are included in the post-test but at a cost of excluding a similar number of features which had appeared in the pre-test

"0" for no change

"-1" for a slight loss, e.g., for a reduction in the number of features included

"-2" for a significant loss, e.g., a reduction in quantity and a loss in quality

2) Change in level of overall cognitive performance in drawing: The full set of a child's pre-test drawings was compared to the full set of his post-test drawings, and a rating was made of overall change in cognitive performance using a single scale of +3 to -2, as just described above.

3) Sum of changes in 8 artistic sub-scales: Each child's set of pre-test drawings was compared to a similar set of his post-test drawings, and a rating was made on the change which was evident in respect to each of eight dimensions of artistic ability, as follows:

(1) change in the degree of "imagination" used to present the subject; making observations on stereotyping vs. originality, following directions routinely vs. inventiveness, poverty of mental imagry vs. richness of mental imagry, literal form vs. whimsical and fanciful form, randomly done vs. thoughtfully done

(2) change in the use of "lines"; making observations on repetitiveness of a given kind of line vs. the use of varied line structures (thick, thin, long, short, wavy, straight, continuous, broken); on the appropriateness of the kinds of lines used for the function they were to perform in the drawing, and on the extent to which the child made use of the variety of ways in which a pencil can be employed as a drawing instrument

(3) change in the use of "shapes"; making observations on the repetitiveness of a given shape vs. the use of varied shapes (round, oval, square, rectangular, regular, irregular), on the appropriateness of the shapes for the function they were to perform in the drawing, on the appropriateness of the placement of the shapes with respect to other shapes in the drawing

(4) change in the use of "shading"; making observations on the range of shading used, from no shading to variable shadings for varied parts of the drawing; on the appropriateness of shadings for the function they were to perform in the drawing

and on the way shading was technically done, i.e., by a scribble of individual lines or by use of the pencil on its side to cover the surface; by using one level of pressure on the pencil for all shadings or by varying the pressure to produce intended effects, different for different portions of the drawing; by letting the act of shading become something in itself, apart from the needs of the drawing as a whole, and therefore out of control, or by holding control (keeping within contours) at the same level of intensity for given areas of the subject

change in the use of "texture"; making observations on the range of patterns and designs used to differentiate parts of the composition, from no use of such patterns and designs to variable uses for varied portions of the picture; on the appropriateness of the textures used for their function in the drawing (which is not only to signify how objects may appear to the eye, but also how they may feel to the touch, e.g., rough, smooth, prickly, grainy, spotted, sharp, soft, decorative, tiny, huge), and on the skill exhibited in accomplishing each attempted effect

(6) on change in "spacial balance," making observations on the extent of paper surface used in the drawing, from a small portion to the whole surface; on distribution of forms over the surface, from scattered and minimally related parts to an organized and well-related whole; on inclusion of surrounding ground for given figures, from the use of figure alone to the use also of background and foreground (where appropriate); and on the extent to which parts were given appropriate proportion in relation to other parts, whether sizes were erratically done or done with a sense of relationships within the whole

(7) change in the use of "perspective"; making observations on the degree to which perspective is realized at all, i.e., whether the child attempted to use overlay to present near forms as in front of more distant forms; to use larger forms for near objects and smaller forms for more distant objects of the same kind; to make nearer forms lighter in shading compared to more distant forms made darker in shading, or to converge receding lines toward a horizon line

(8) change in degree of "spontaneity"; making observations on the extent to which the drawing reveals the child as freely involved in generative acts of his own, noting whether the drawing was minimally done to meet an "outside" assignment or maximally done to fulfill the expression of oncoming "inner" imagry; whether the work was dull or fresh, cramped or free, scanty or full, task laden to spirited, done as "activity" or "experienced"

On each of the eight dimensions, scoring was done on the scale of a +3 to a -2, as follows:

"+3" for a striking gain

"+2" for a significant gain

"+1" for a slight gain

"0" for no change

"-1" for a slight loss

"-2" for a significant loss

4) Change in level of overall artistic performance in drawing: The full set of a child's pre-test drawings was compared to the full set of his post-test drawings, and a rating was made of overall change in artistic performance, using a single scale of +3 to -2, as just described above.

F. Comparison of the Teaching Groups Before Intervention

Although the children in the research sample in each national group were randomly selected from among all the children taught, and although the teaching methods were randomly assigned among the preschools enrolling disadvantaged children, a comparison was made between the teaching groups, based on the pre-test scores they had made on four of the tests measuring drawing ability and on their IQ pre-test scores in order to further check the comparability of the teaching groups.

To facilitate the comparison of the groups on each of the four drawing tests, the scores for the test drawings of man, house, and TV (or radio) were summed, these test drawings being used since they were comparable between the two national groups. The data on the means of the summed scores for the American teaching groups is given in Table 49 and, for the Israeli teaching groups, in Table 50.

TABLE 49

Means of the Summed Scores on Three Pre-Test Drawings as Made by the American Teaching Groups

Tests	Control	Discussion	Observation	Touch	Technique	Total
1. Level of drawing a recognizable figure	8.1	8.1	8.4	8.3	8.2	8.2
2. Number of concepts in drawing figure and ground	16.9	17.1	17.0	16.7	16.5	16.8
3. Level of cognitive performance in drawings	6.9	5.9	6.2	6.6	6.4	6.4
4. Level of artistic performance in drawings	10.7	9.9	10.6	9.2	9.6	10.1

TABLE 50

Means of the Summed Scores on Three Pre-Test Drawings as Made by the Israeli Teaching Groups

Tests	Control	Discussion	Observation	Touch	Total
1. Level of drawing a recognizable figure	7.4	7.3	6.9	7.2	7.2
2. Number of concepts in drawing figure and ground	11.1	10.3	8.7	9.8	10.1
3. Level of cognitive performance in drawings	6.9	5.0	5.5	4.7	5.6
4. Level of artistic performance in drawings	11.1	10.7	9.7	9.9	10.4

Inspection of the figures across rows in the American table reveals a high degree of consistency in the level of performance of the five American groups on the four drawing pre-tests. By Analysis of Variance, we found for these data, that difference among the teaching groups did not reach .05 level of significance on the first three tests, these three all having to do with cognitive content. On the fourth test, having to do with levels of artistic performance in drawing, there was a significant difference among the teaching groups at the .01 level.

Inspection of the figures across rows in the Israeli table reveals relative consistency in the level of performance of the four Israeli groups on the four drawing tests. By Analysis of Variance, we found for these data, that differences among the teaching groups did not reach .05 levels of significance, except on the test, Level of Cognitive Performance in Drawing, where the significance of the difference was .005.

The data on the means of the IQ scores for the American teaching groups is given in Table 51, and for the Israeli teaching groups, in Table 52.

TABLE 51

Means of the Pre-Test Scores on the Harris Draw-a-Man IQ Test as Made by the American Teaching Groups

Groups	Total Group Mean IQ	Prekindergarten Children Mean IQ	Kindergarten Children Mean IQ
Control	90	88	92
Discussion	86	88	84
Observation	86	83	89
Touch	84	81	87
Technique	82	76	88

TABLE 52

Means of the Pre-Test Scores on the Harris Draw-a-Man IQ Test as Made by the Israeli Teaching Groups

Groups	tal oup Mean IQ	Prekindergarten Children Mean IQ	Kindergarten Children Mean IQ
Control	84	80	87
Discussion	82	83	82
Observation	75	69	79
Touch	83	80	85

Inspection of the figures down the columns in each of the tables reveals a general consistency across the teaching groups in each national setting; however, there were some differences.

The differences among the teaching groups on the four dr ing tests and on the IQ test were relatively small, taking the full ran e of data into account; however, they were sufficient to support the u e of the statistical procedure reported below.

G. Statistical Operations

In processing the data on gains in the instance of both the American and Israeli groups, we used one-way Analysis of Covariance to take into account significant differences on tests where such differences appeared. Our data on gains by teaching groups should therefore reflect the effectiveness of the methods without the confounding effect of significant differences in the teaching groups with respect to their initial levels of ability on either the test being reported on at a given time, or on IQ.

CHAPTER VIII
HYPOTHESES: DERIVATION, DATA AND INTERPRETATION

A. Concerning the Gains of the Control Group as Compared to the Experimental Groups

1) Assumptions leading to hypothesis: Traditional methods of using drawing in teaching preschool children do not promote intervention by the teacher in behalf of the development of the drawing ability or verbal ability of the children. The assumption of this method is that such development, if it occurs, will come only if the child is left to himself to make his own choices of what he shall draw and how he shall draw it. He is to be supported by opportunity to draw, materials for drawing, and appreciation by the teacher of what he does do, but the teacher is not to intervene in his drawing activity.

Our assumption, on the other hand, is that the traditional method will produce little, if any, development in drawing ability or verbal ability, reasoning that preschool disadvantaged children need specific kinds of support in developing their drawing and verbal abilities if they are to achieve such development.

2) Hypothesis F: data and interpretation

Hypothesis F: (1) Compared to the experimental methods, the traditional method will show little, if any, adjusted mean gain on the tests. (2) Any one of the experimental methods will show adjusted mean gains on the tests which are greater than those made by the traditional (Control) group.

American data (Tables 53, 54) The hypothesis, in both its parts, is confirmed. Among the five teaching methods, the traditional group ranked last on every test. Of the ten tests, the Control children lost ability on three, rather than gaining ability; on the remaining seven, their gains were but fractional parts of the gains made by the lowest of the experimental groups.

Israeli data: (Tables 56, 57) The hypothesis, in both its parts, is confirmed for cognitive drawing ability; it is partially confirmed for artistic drawing ability, and not confirmed for related verbal ability. On cognitive drawing ability, Control ranked consistently last on all five tests; its children lost slightly on two tests, and on the remaining three, made gains which were but fractional parts of the gains made by the lowest of the experimental groups. On artistic drawing ability, Control outranked Discussion, though the reason was that Discussion lost more heavily than Control; neither group made gains. On related verbal ability, Control outranked both Discussion and Observation. On duplicate concepts, Control outranked Touch (which had otherwise led on all other tests in the battery).

TABLE 53

Adjusted Mean Change by Teaching Groups;
All Test Items Used; Grades Combined
American Group

	Control	Discuss.	Observ.	Touch	Technique
Cognitive drawing					
Level of drawing a recognizable figure	.10	.61	.84	.53	.62
Number of concepts in drawing figure and ground	.11	2.21	2.96	1.98	2.85
Level of cognitive performance in drawing	.22	1.11	1.53	1.02	1.12
Sum of changes in 10 cognitive sub-scales	.58	3.49	5.20	3.03	3.62
Level of overall cognitive performance in drawing	.17	.87	1.27	.73	1.00
Artistic drawing					
Level of artistic performance in drawing	.17	.78	1.02	.48	.95
Sum of changes in eight artistic sub-scales	-1.14	2.56	3.58	2.53	5.75
Level of overall artistic performance in drawing	-.22	.78	.88	.80	1.35
Related verbal					
Number of concepts in words for subject and setting	.88	3.07	3.60	1.06	2.56
Drawing and verbal					
Number of duplicate concepts in drawing and words	-.06	1.46	2.41	1.23	2.06

TABLE 54

Rank Order of
Adjusted Mean Change by Teaching Groups;
All Test Items Used; Grades Combined
American Group

Tests	Teaching Groups				
	Control	Discuss.	Observ.	Touch	Technique
Cognitive drawing					
Level of drawing a recognizable figure	5	3	1	4	2
Number of concepts in drawing figure and ground	5	3	1	4	2
Level of cognitive performance in drawing	5	3	1	4	2
Sum of changes in 10 cognitive sub-scales	5	3	1	4	2
Level of overall cognitive performance in drawing	5	3	1	4	2
Artistic drawing					
Level of artistic performance in drawing	5	3	1	4	2
Sum of changes in eight artistic sub-scales	5	3	2	4	1
Level of overall artistic performance in drawing	5	4	2	3	1
Related verbal					
Number of concepts in words for subject and setting	5	2	1	4	3
Drawing and verbal					
Number of duplicate concepts in drawing and words	5	3	1	4	2

TABLE 55

Summary Rank Order by Classes of Tests;
Adjusted Mean Change by Teaching Groups
All Test Items Used; Grades Combined
American Group

Class of test	Teaching Groups				
	Control	Discuss.	Observ.	Touch	Technique
Five tests of cognitive drawing ability	**5	3	1	4	2
Three tests of artistic drawing ability	**5	3	2	4	1
One test of related verbal ability: Number of concepts in words	5	3	1	4	2
All ten tests in the battery	**5	3	1	4	2

Note: Where more than one test was included in a class, (1) the ranks were summed for each teaching group and the sums were ranked, and (2) the Kendall W was used to derive the significance of the differences in ranks as among the tests in that class.

**Significant at .01 level for the row

TABLE 56

Adjusted Mean Change by Teaching Groups
All Test Items Used; Grades Combined
Israeli Group

Tests	Control	Discuss.	Observ.	Touch
Cognitive drawing				
Level of drawing a recognizable figure	-.01	.25	.31	.42
Number of concepts in drawing figure and ground	.45	1.04	.76	1.50
Level of cognitive performance in drawing	.22	.45	.77	.83
Sum of changes in 10 cognitive sub-scales	.21	1.60	2.40	3.11
Level of overall cognitive performance in drawing	-.03	.56	.63	.69
Artistic drawing				
Level of artistic performance in drawing	.09	-.02	.42	.66
Sum of changes in eight artistic sub-scales	-.15	-.63	1.72	4.23
Level of overall artistic performance in drawing	-.05	-.09	.51	.84
Related verbal				
Number of concepts in words for subject and setting	.59	.51	-.09	1.70
Drawing and verbal				
Number of duplicate concepts in drawing and words	1.05	1.30	1.49	.54

TABLE 57

Rank Order of Adjusted Mean Gain by Teaching Groups
All Test Items Used; Grades Combined
Israeli Group

Tests	Control	Teaching Groups Discuss.	Observ.	Touch
Cognitive drawing				
Level of drawing a recognizable figure	4	3	2	1
Number of concepts in drawing figure and ground	4	2	3	1
Level of cognitive performance in drawing	4	3	2	1
Sum of changes in 10 cognitive sub-scales	4	3	2	1
Level of overall cognitive performance in drawing	4	3	2	1
Artistic drawing				
Level of artistic performance in drawing	3	4	2	1
Sum of changes in eight artistic sub-scales	3	4	2	1
Level of overall artistic performance in drawing	3	4	2	1
Related verbal				
Number of concepts in words for subject and setting	2	3	4	1
Drawing and verbal				
Number of duplicate concepts in drawing and words	3	2	1	4

TABLE 58

Summary Rank Order by Classes of Tests;
Adjusted Mean Change by Teaching Groups;
All Test Items Used; Grades Combined
Israeli Group

Class of test	Control	Discuss.	Observ.	Touch
Five tests of cognitive drawing ability	**4	3	2	1
Three tests of artistic drawing ability	**3	4	2	1
One test of related verbal ability: Number of concepts in words	2	3	4	1
All ten tests in the battery	**4	3	2	1

Note: Where more than one test was included in a class, (1) the ranks were summed for each teaching group and the sums were then ranked, and (2) the Kendall W was used to derive the significance of the difference in ranks as among the tests in that class.

**Significance at .01 level for the row

In summary, the data show the hypothesis confirmed on all three abilities for the American group, and on cognitive drawing abilities for the Israeli group. Control became competitive with the experimental groups in positive gains in the Israeli group on the test of verbal ability. Otherwise Control was ineffective.

We interpret these data as evidence that the traditional method of using drawing in teaching preschool children does not develop disadvantaged children. Their drawing does not improve in cognitive content or artistically. On the latter, especially, they may even lose ground, going into the negative direction; out of three tests of artistic ability, the American children lost on two and the Israeli children lost on two. The defense of the traditional method sometimes made is that teacher non-intervention allows the children to develop their own artistic (affective) capacities; the evidence is to the contrary; they lose ground; they do not gain. On verbal expression, they may make a competitive gain, but this is not borne out for the American children.

Without teacher intervention, the children seem to stand still; they have no way to know what progress is and thus make little. With intervention, however, they can and do develop as indicated in the gains of the experimental methods. Compared to the Control group, the weakest of the experimental groups in the American setting was a consistent producer of gains in all three abilities tested. All the experimental methods productively served the American group. The Israeli group did not so fully gain in all its experimental methods; on cognitive ability in drawing, the weakest was comfortably higher than the Control group; otherwise the weakest was lower than Control on artistic and verbal abilities. This result for Israel merits more extended discussion which is offered in Section E of this chapter.

Turning from the weakest of the experimental methods to the strongest, the results are clear and unambiguous. If we wish, we can use methods of teaching with drawing which consistently produce gains in dimensions of growth we know to be important to later school success.

B. Concerning the Gains of the Teaching Groups Relative to Each Other

1) Assumptions leading to hypotheses: Drawing is to be seen not only as a way of expression but also as a way of communication. During drawing, a child is revealing what he knows of the world and himself. If his drawing is also taken by "significant others" as a way the child is using to speak to them about what he knows and can do, drawing can become a communicative medium. Entering into communication with a child in this manner, teachers can intervene in the child's drawing activity to support the child in what he has already accomplished and to help him accomplish more. Intervention in drawing activity is therefore possible in behalf of the development of the child.

Such intervention, however, needs to be specifically constructed to produce specific kinds of support for specific kinds of development. Intervention needs to be highly conscious of what is intended, assumed, hypothesized, observed, and tested, if development, in fact, is to occur.

Granted this level of conscious specificity, preschool disadvantaged children can develop in their drawing abilities and related verbal abilities when taught by methods designed to enable the teacher to intervene in specific ways to support the children in their development of those abilities.

The experimental teaching methods in this project were each designed to provide specific kinds of support. The methods, designed in series (see Table 1), were so formed as to progressively increase in the kinds of differentiation which were utilized. The Discussion method is narrowest, depending on verbal differentiation alone. The Observation method, while also using words, depends primarily on visual differentiation of the subject to be drawn. The Touch method, while also using words and visual differentiation, depends also on tactile and kinesthetic differentiation of the subject to be drawn. The Technique method, equal to but not more complex than Touch, substitutes for tactile and kinesthetic differentiation, specific technical training in drawing (using also verbal and visual differentiation). In the Israeli experiment, Touch is the most inclusive of the methods in respect to the range of differentiations included; it used Touch (as defined for the American experiment) but also included some of the elements of Technique (as defined for the American experiment).

We assume that those methods which are most fully focused on producing gains in a particular kind of ability will produce such gains better than other methods will; however, they will not be able to lead other methods on abilities they do not specifically focus on. This is to say Discussion, focusing on words, will produce greater gains in verbal ability than other methods, but will not lead other methods on cognitive or artistic drawing abilities. Observation, focusing on cognitive aspects of objects to be drawn, will lead in cognitive drawing abilities, but not on artistic drawing abilities or verbal abilities. Technique, focusing on drawing acts, as such, will lead on artistic drawing abilities, but not on cognitive drawing or verbal abilities. However, over the total battery of tests, it will be the broadest methods which will turn out to be the battery leaders; i.e., Touch or Technique for the American group, and Touch for the Israeli group.

2) Hypothesis G: data and interpretation

Hypothesis G: As between teaching groups, those which provide the widest range of differentiation will produce the greatest gain on the full battery of tests; for the American experiment, this means Touch or Technique will lead; for the Israeli experiment, this means Touch (which also included elements of Technique) will lead.

American data: (Table 55) The hypothesis is not confirmed. The rank order of the full battery of tests was Observation (first), Technique, Discussion, Touch, and Control. Neither Touch nor Technique took the top rank, though Technique produced gains close to first. Touch was the least effective of the experimental methods in the American experiment.

Israeli data: (Table 58) The hypothesis is fully confirmed. The rank order of the full battery of tests was Touch (first), Observation, Discussion, and Control. The rank order, in terms of widest range to the narrowest, was complete.

We interpret these differing national results to be evidence that we had not sufficiently refined our thought in forming the hypothesis or the assumptions underlying it. We had hypothesized that on the total battery of tests, the broadest based methods would take leadership. We had fallen into the easy presumption that if the exercise of two sensory modalities were better than one, then three would be better than two, and four would be better than three. Such does not turn out to be the case; Touch exercised the most sensory modalities in that the children were stimulated by verbal cues, visual cues, tactile cues and kinesthetic cues as to the nature of the objects to be made the subjects of drawing. Touch was the weakest of the experimental methods in the American experiment.

A clue to our error came in the results obtained on the American Technique group which produced overall results next to the top. Technique was, in one sense, nearly as broadly based as Touch in that it included the complexities of verbal differentiation, visual differentiation, and differentiation in the third domain of action in doing the drawing. But the last mode of differentiation was not like the others; rather than being on the side of additional impingement of direct sensory input, it offered an output possibility so that the children had more in expression to use as a way of handling the multiple stimulation they were receiving. Technique was better balanced between strength of input and strength of output than was Touch.

Better balanced still was Observation which, in America, surpassed Technique in overall battery results. Observation puts direct emphasis on visual differentiation of features of objects, nicely balancing the need in drawing of putting emphasis on visual differentiations in the forms the child makes. The key would therefore appear to be the balance of quantity and kind of input relative to the quantity and kind of output, rather than being a mere multiplication of sensory input.

The Israeli results, different from the American, appear to counter this hypothesis, but on further analysis, do more to support it than counter it. The Touch group, in Israel, was forerunner to what in America became differentiated into the two methods of Touch and Technique. It was directly built on the presumption that the greater the range of

the mix, the better; Touch was built not simply as close involvement by touch with the objects to be used as models, but also as technique in the sense that the teachers were encouraged to also help the children in making the forms they needed in their act of drawing whenever the teachers could manage to do so; it was not a systematic operation to the degree it became such in the American Technique group, but it was, nevertheless, a factor in the experiencing of many of the children. This meant that the gains of the Touch group in Israel had partially hidden in them the balancing strength of more adequate means of expression for the greater stimulation received. The placement of Touch in the first rank in Israel may, therefore, be the consequence more of balance between input and output than of a broader base of stimulation. Followed to its extreme, the principle of balance would imply that Observation ought to do still better than Touch in Israel because Observation is still a better balanced method, as the American data seemed clearly to show. Yet Observation did not take first in Israel, though it did take second. There are other factors to consider, some of which are discussed under Hypothesis M, comparing results by grade levels, and under Hypothesis N, comparing results by national groups.

Hypothesis H: data and interpretation

Hypothesis H: As between teaching groups, those which have sharpest focus on given abilities will show greater gains in those abilities than will be shown by other methods, but in areas of ability not focused on, their leadership will not hold. On tests of cognitive drawing ability, Observation will lead in both countries; on tests of artistic drawing ability, Technique will lead in America, and Touch (which also included elements of Technique) will lead in Israel; on the test of verbal ability, Discussion will lead in both countries. When leading, as predicted, these methods will not be leading in other abilities.

American data: (Table 55) The hypothesis is largely confirmed. To be fully confirmed, the predictions and the data should meet at nine junctures; they met at seven. Observation followed prediction in being the leader on the tests of cognitive drawing ability and on not being leader on the tests of artistic drawing ability, but it led on verbal ability when we had predicted it would not. Technique followed prediction on all three points; it led on tests of artistic drawing ability and it did not lead in either of the remaining two abilities. Discussion did not lead on verbal ability as we had predicted it should, but following predictions, it did not take the lead in either cognitive or artistic drawing abilities.

Israeli data: (Table 58) The hypothesis is dubiously confirmed; we would prefer to say not confirmed. The predictions and the data meet on five of the necessary nine junctures. Observation did not take the lead on tests of cognitive drawing ability, as we predicted it should,

but following predictions, it did not take the lead in either artistic drawing ability or verbal ability. Touch took the lead on the tests of artistic drawing ability, as predicted, but it also took the lead on both cognitive drawing ability and verbal ability when we had predicted it would not. Discussion did not lead on the test of verbal ability, as we predicted it should, but following predictions, it did not take the lead on either cognitive or artistic drawing abilities.

We interpret this data as evidence that when the teaching methods are clearly differentiated, as they were in the American experiment, they will each tend to produce top gains in their particular area of primary focus and will not produce top gains in other areas when in competition with methods which focus on the other areas. When the methods are not clearly differentiated, as was the case for the Touch group in Israel, the results become ambiguous. It was the results on Touch which confounded the data there obtained. Using the American finding as empirically and conceptually cleanest, we can say the tendency is as hypothesized; i.e., one tends to get the kind of results one aims for and disciplines himself to attain; the children are highly responsive to the subtleties of the teaching they receive. It is salutory to remember that only 15 clock hours were involved in the teaching each group received during this experiment (30 one-half hour sessions offered three times a week over a 10-week period.) Yet the results from each group reflect the subtleties of the differences among the methods used. How teaching is done makes a great difference and no one knows it better, operationally, than the children who sensitively respond to whatever it is.

Reasoning from the Israeli experience rather than from the American experience, one could observe that the "right mix" of methods may be better than particular methods carried in the "pure" strain; Touch, a mixed method, was the best producer in that situation. With the right mix, one might be able to make more kinds of gain "all at once." There is, however, yet another alternative when taking into account the operating situation in preschools where drawing can well be used, not for just 10 weeks, but over the year. A sequence of methods, each emphasizing a particular kind of ability for a stipulated period may be preferable to a "right mix" method used all the time. It is difficult, and perhaps unwise, to look for the right (simultaneous) mix. This point will be discussed in the recommendations included in the final chapter of the report.

C. Concerning the Gains of the Teaching Groups Relative to Items Taught and Not Taught

1) Assumptions leading to hypotheses: Those methods which are most successful in producing gains on items taught will also be most successful in producing gains on items not taught. To learn to draw is to learn a process of forming relationships within certain parameters;

to learn to speak is, similarly, to learn a process of forming relationships within certain parameters. These processes are more inclusive than the subject matters with which they may deal at any given time. Granted the same time and subject matters for teaching and testing in all methods, those methods which enable the children to be most successful in exercising the process on taught items should again show most success on items not taught.

2) Hypothesis I: data and interpretation

Hypothesis I: As between the gains on taught items and not taught items, the level of gain on the items taught will be greater than the level of gain on the items not taught for each test in each of the experimental teaching groups; in the Control group, gains on taught items will not hold this relationship.

American data: (Tables 59, 60) The hypothesis is confirmed. In the four experimental groups, the gains on items taught were greater than the gains on items not taught in 24 of the 28 cells of comparison. In the Control group, gains on the taught items did not hold this relationship; gains on the taught items were less than the gains on the not taught items in all seven of the seven cells of comparison.

Of the four exceptions in the experimental groups, three were within one teaching method, i.e., Technique, all being on tests of cognitive drawing ability.

Israeli data: (Tables 61, 62) The hypothesis is confirmed. In the three experimental groups, the gains on taught items were greater than the gains on the items not taught in 12 of the 15 cells of comparison. In the Control group, gains on the taught items did not consistently hold this relationship; gains on the taught items were less than the gains on the items not taught in two of the five cells of comparison.

Of the three exceptions in the experimental group, two were within one teaching method, i.e., Observation, both being on tests of cognitive drawing ability.

We interpret this data as evidence (1) that the traditional way of using drawing does not enable the children to transfer from what they have been taught to what they have not been taught since they have no way of knowing what they have or have not been taught, and (2) that the best way to get transfer of ability from items taught to items not taught is to teach well on the items taught.

TABLE 59

Adjusted Mean Change by Teaching Groups
Grades Combined; Two Items Taught vs. Two
Items Not Taught; American Group

Tests	Control Items		Discussion Items		Observation Items		Touch Items		Technique Items	
	Tau.	Not	Tau.	Not	Tau.	Not	Tau.	Not	Tau.	Not
Cognitive drawing										
Level of drawing a recognizable figure	.06	.13	.67	.55	1.02	.66	.63	.44	.53	.71
Number of concepts in drawing figure and ground	-.17	.39	2.60	1.81	3.50	2.39	2.58	1.36	3.21	2.49
Level of cognitive performance in drawing	.10	.34	1.27	.95	1.73	1.31	1.21	.82	1.01	1.24
Sum of changes in 10 cognitive sub-scales	.51	.65	4.11	2.83	5.85	4.49	3.44	2.60	3.52	3.72
Artistic drawing										
Level of artistic performance in drawing	.10	.24	.87	.69	1.00	1.04	.65	.31	1.02	.87
Related verbal										
Number of concepts in words for subject and setting	.56	1.20	4.00	2.13	4.23	2.97	2.09	-.01	3.21	1.92
Drawing and verbal										
Number of duplicate concepts in drawin and words	.16	.04	2.23	.68	3.64	1.12	1.83	.61	2.80	1.30

TABLE 60

Rank Order of Adjusted Mean Change by Teaching Groups
Grades Combined; Two Items Taught vs.
Two Items Not Taught; American Group

Tests	Control Items		Discussion Items		Observation Items		Touch Items		Technique Items	
	Tau.	Not	Tau.	Not	Tau.	Not	Tau.	Not	Tau.	Not
Cognitive drawing										
Level of drawing a recognizable figure	5	5	2	3	1	2	3	4	4	1
Number of concepts in drawir figure and ground	5	5	3	3	1	2	4	4	2	1
Level of cognitive performance in drawing	5	5	2	3	1	1	3	4	4	2
Sum of changes in 10 cognitive sub-scales	5	5	2	3	1	1	4	4	3	2
Artistic drawing										
Level of artistic performance in drawing	5	5	3	3	2	1	4	4	1	2
Related verbal										
Number of concepts in words for subject and setting	5	4	2	2	1	1	4	5	3	3
Drawing and verbal										
Number of duplicate concepts in drawing and words	5	5	3	3	1	2	4	4	2	1

TABLE 61

Adjusted Mean Change by Teaching Groups
Grades Combined; One Item Taught vs.
Two Items Not Taught; Israeli Group

Tests	Control Items		Discussion Items		Observation Items		Touch Items	
	Tau.	Not	Tau.	Not	Tau.	Not	Tau.	Not
Cognitive drawing								
Level of drawing a recognizable figure	-.06	.01	.31	.22	.32	.31	.39	.44
Number of concpets in drawing figure and ground	.80	.28	1.62	.70	1.10	.58	2.49	1.04
Level of cognitive performance in drawing	.32	.17	.50	.43	.62	.85	.97	.76
Sum of changes in 10 cognitive sub-scales	.15	.24	1.66	1.56	2.00	2.62	3.49	2.91
Artistic drawing								
Level of artistic performance in drawing	.24	.02	.21	-.13	.18	.56	.70	.63

TABLE 62

Adjusted Mean Change by Teaching Groups
Grades Combined; One Item Taught vs.
Two Items Not Taught; Israeli Group

Tests	Control Items		Discussion Items		Observation Items		Touch Items	
	Tau.	Not	Tau.	Not	Tau.	Not	Tau.	Not
Cognitive drawing								
Level of drawing a recognizable figure	4	4	3	3	2	2	1	1
Number of concepts in drawing figure and ground	4	4	2	2	3	3	1	1
Level of cognitive performance in drawing	4	4	3	3	2	1	1	2
Sum of changes in 10 cognitive sub-scales	4	4	3	3	2	2	1	1
Artistic drawing								
Level of artistic performance in drawing	2	3	3	4	4	2	1	1

3) Hypothesis J: data and interpretation

Hypothesis J: As among teaching methods, the rank order in which they produce gains on the items taught will be the rank order in which they produce gains on the items not taught.

American data: (Table 60) The hypothesis is confirmed. The rank order for the total battery of tests was identical for the taught and not taught items. In 33 of the 35 cells of comparison for the specific tests, the ranks were the same (on 18) or within one of each other (on 15).

The two exceptions were in one teaching method, i.e., Technique, where the rank of gains in two cognitive drawing tests on the not taught items was higher than the rank of gain on the taught items.

Israeli data: (Table 62) The hypothesis is confirmed. The rank order for the total battery of tests was identical for the taught and not taught items. In 19 of the 20 cells of comparison for the specific tests, the ranks were the same (on 15) or within one of each other (on 4).

The one exception was in Observation where the rank of gain on the not taught items was higher than the rank of gain on the taught items.

We interpret this rank order data as further supporting evidence for the statement that the best way to get transfer of ability from items taught to items not taught is to teach well on the items taught. The rank order data say, with systematic regularity, that the level at which a given method is able to produce gain on taught items, compared to other methods, will be the level at which it also tends to produce gain in not taught items, compared to other methods.

The exceptions are cases in which there is greater gain on the not taught items than on the taught items, and where the ranks fluctuate to accommodate this exceptional performance. This was the case for Technique in the American experiment, and for Observation in the Israeli experiment on tests in the cognitive drawing area. Technique, in the American data, was able to produce higher means for not taught items than for taught items on three of the four tests of cognitive drawing ability, and on all four of these tests to produce higher rankings for not taught items than taught items. Observation, in the Israeli data, was able to produce higher means for not taught items than for taught items in two of the four tests of cognitive drawing ability, and on one of these tests to produce a higher ranking for not taught than for taught items. In these instances, the implication is that the method was operating at maximum efficiency of transfer; it was producing gains on new and untaught problems which were equal to, or somewhat better than, gains produced on familiar and taught items; further it was doing this better than other methods did. What is there about the Technique method and the Observation method which would make efficient transfer possible?

Technique goes directly into the drawing act; it teaches children to recognize common forms that recurrently appear in common subjects, and to draw those kinds of forms. It enables children to use a process of making those forms as a way of dealing with one subject after another; the subject matter, e.g., a house, is less important than the forms the house displays for being drawn. In the extreme, it is a method which can lead children to see forms they can draw "regardless of the subject." That this procedure, carried to extreme, may not be the best for cognitive development purposes is indicated by the fact that in the American experiment, the Observation group made even better gains on the cognitive drawing tests than Technique on all four tests reported, outranking Technique on all four tests in items taught and on two tests in items not taught. Thus, Observation was able to do without teaching specifically how to see and draw particular kinds of forms. Observation teaches the children to see what features pertain to what subjects, and to then try to enter those known features into the drawings of those subjects. The drawing is to reflect the character of the object being drawn. It emphasizes "knowns" about items in the environment; when the children draw forms, they do so in an effort to represent a known, not in an effort to make a given kind of known form as could be the tendency in Technique.

In the Israeli data, Observation provided the "exceptions," following the American tendency toward transfer efficiency for Observation. It is necessary to note, however that it was Touch which took the lead in both taught and not taught items on the cognitive drawing tests when rank order is used to make comparisons. It was Touch which contained some elements of Technique in the Israeli experiment. The question is perhaps, not so much of what method is superior, taken alone, but what sequential or interrelated pattern of methods would make for the best developmental plan. This question is discussed in the final chapter of the report.

D. Concerning the Gains of the Teaching Groups Relative to the Two Grade Levels

1) Assumptions leading to hypotheses: During teaching, prekindergarten disadvantaged children will just be beginning to learn to draw forms having a sensed relation to objects in their environment, and they will just be beginning to learn to use words as formal descriptors for features of those objects. Kindergarten disadvantaged children, on the other hand, will, at the beginning of the teaching program, have already developed rudimentary levels of drawing and verbalization in reference to given environmental objects, and will be able to respond to the teaching with more obvious and wider ranging kinds of gain. We can therefore assume kindergarten children will consistently make greater gains than prekindergarten children in all the tests.

As among the three kinds of abilities tested, the prekindergarten children will show themselves better able to approximate the gains of the kindergarten children on cognitive drawing tests than on tests of

artistic drawing ability or verbal ability. This will be the case in relation to artistic drawing ability because a threshold level of cognitive development is necessary before artistic development can show. Their gains on verbal ability will be relatively less (compared to kindergarten children) than on cognitive drawing ability because drawing offers more of an evident structure on which children can see themselves developing than is offered by the spoken word.

Anticipating variations in the behavior of prekindergarten children as compared to kindergarten children with respect to each of the abilities tested, we also anticipate that the rank order of gains for the teaching methods will vary for the total battery, as between prekindergarten and kindergarten children. Methods which fit the potentialities of prekindergarten children may not synchronously fit the potentialities of kindergarten children, taking the whole battery into account, as well as the separate classes of abilities tested.

2) Hypothesis K: data and interpretation

Hypothesis K: As between the two grade levels, the kindergarten children will make greater gain than the prekindergarten children on each test in each teaching group.

American data: (Table 63) The hypothesis is confirmed. Out of 50 cells of comparison provided in the table, kindergarten children made greater gains in 46. The four exceptions are scattered.

Israeli data: (Table 66) The hypothesis is confirmed. Out of 40 cells of comparison, kindergarten children made greater gains in 29. The 11 exceptions show six clustered in the Observation group, where in that method, prekindergarten children made greater gains than kindergarten children on every one of the five tests of cognitive ability in drawing, and on one of the three tests of artistic ability in drawing.

We interpret the data as evidence that the kindergarten children are generally able to gain more from the teaching methods than the prekindergarten children are able to gain, when gain is measured quantitatively on the tests provided. More of the kindergarten than prekindergarten children have passed threshold levels of performance and can proceed upward from there.

The superior gain of the kindergarten children was systematic for the American children; for the Israeli children, one teaching method became an exception in that its prekindergarten children made higher gains than did its kindergarten children on six of the 10 tests in the battery (five being the full set of tests on cognitive drawing abilities). This was Observation. Following on the discussion offered in connection with taught and not taught items, we again see the productive power of the Observation method; it not only had high transfer value but high teaching value for the younger children. It made relatively high gains, not only

TABLE 63

Adjusted Mean Change by Teaching Groups; All Test Items Used; Prekindergarten and Kindergarten; American Group

Tests	Teaching Groups									
	Control		Discuss.		Observ.		Touch		Tech.	
Grade level	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.
Cognitive drawing										
Level of drawing a recognizable figure	-.17	.35	.50	.71	.74	.93	.30	.76	.55	.68
Number of concepts in drawing figure and ground	-.58	.79	2.02	2.38	2.42	3.42	1.62	2.30	2.67	3.00
Level of cognitive performance in drawing	-.15	.58	.91	1.32	1.32	1.71	.47	1.51	.77	1.43
Sum of changes in 10 cognitive sub-scales	.39	.77	3.02	3.92	3.78	6.43	2.21	3.75	3.30	3.90
Level of overall cognitive performance in drawing	-.04	.38	.85	.89	1.00	1.50	.45	1.00	.73	1.23
Artistic drawing										
Level of artistic performance in drawing	-.27	.60	.69	.88	.63	1.41	.14	.82	.62	1.22
Sum of changes in 8 artistic sub-scales	-.68	-1.59	1.67	3.49	3.27	3.89	3.73	1.22	4.37	6.80
Level of overall artistic performance in drawing	-.28	-.16	.51	1.07	.77	1.09	1.03	.54	1.05	1.58
Related verbal										
Number of concepts in words for subject and setting	.70	1.06	1.76	4.24	3.61	3.59	.43	1.62	.17	4.60
Drawing and verbal										
Number of duplicates in drawing and words	-.26	.15	1.30	1.57	2.34	2.45	.84	1.58	1.32	2.68

TABLE 64

Rank Order of
Adjusted Mean Change by Teaching Groups;
All Test Items Used; Prekindergarten
and Kindergarten; American Group

Tests	Teaching Groups									
	Control		Discuss.		Observ.		Touch		Tech.	
Grade level	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.
Cognitive drawing										
Level of drawing a recognizable figure	5	5	3	3	1	1	4	2	2	4
Number of concepts in drawing figure and ground	5	5	3	3	2	1	4	4	1	2
Level of cognitive performance in drawing	5	5	2	4	1	1	4	2	3	3
Sum of changes in 10 cognitive sub-scales	5	5	3	2	1	1	4	4	2	3
evel of overall cognitive performance in drawing	5	5	2	4	1	1	4	3	3	2
Artistic drawing										
Level of artistic performance in drawing	5	5	1	3	2	1	4	4	3	2
Sum of changes in 8 artistic sub-scales	5	5	4	3	3	2	2	4	1	1
Level of overall artistic performance in drawing	5	5	4	2	3	3	2	4	1	1
Related verbal										
Number of concepts in words for subject and setting	3	5	2	2	1	3	4	4	5	1
Drawing and verbal										
Number of duplicates in drawing and words	5	5	3	4	1	2	4	3	2	1

TABLE 65

Summary Rank Order by Classes of Tests;
Adjusted Mean Change by Teaching Groups;
All Test Items Used; Prekindergarten and
Kindergarten; American Group

Class of test	Teaching Groups									
	Control		Discuss.		Observ.		Touch		Tech.	
Grade level	Pre	Kdg.	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.
Five tests of cognitive drawing ability	**5	*5	3	4	1	1	4	3	2	2
Three tests of artistic drawing ability	5	**5	4	3	2½	2	2½	4	1	1
One test of related verbal ability: number of concepts in words	3	5	2	2	1	3	4	4	5	1
All ten tests in the battery	**5	**5	3	3	1	1	4	4	2	2

Note: Where more than one test was included in a class, (1) the ranks were summed for each teaching group and the sums were ranked, and (2) the Kendall W was used to derive the significance of the differences in ranks as among the tests in that class.

* Significant at the .05 level for the row
**Significant at the .01 level for the row

TABLE 66

Adjusted Mean Change by Teaching Groups;
All Test Items Used; Prekindergarten
and Kindergarten; Israeli Group

Tests	Teaching Groups							
	Control		Discuss.		Observ.		Touch	
Grade level	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.
Cognitive drawing								
Level of drawing a recognizable figure	-.18	.09	.16	.38	.72	.10	.59	.28
Number of concepts in drawing figure and ground	-.72	1.14	.36	1.93	1.26	.49	1.31	1.66
Level of cognitive performance in drawing	.01	.35	.28	.68	1.29	.49	.65	.99
Sum of changes in 10 cognitive sub-scales	.61	-.03	1.28	2.01	4.51	1.28	2.47	3.66
Level of overall cognitive performance in drawing	.07	.10	.44	.72	.95	.42	.75	.64
Artistic drawing								
Level of artistic performance in drawing	-.22	.28	-.18	.20	.22	.53	.17	1.08
Sum of changes in 8 artistic sub-scales	.00	-.23	-2.20	1.38	-.30	2.81	.37	7.31
Level of overall artistic performance in drawing	-.08	-.04	-.34	.22	.52	.50	.38	1.20
Related verbal								
Number of concepts in words for subject and setting	.62	.56	.45	.58	-.56	.21	.92	2.19
Drawing and verbal								
Number of duplicates in drawing and words	.73	1.28	1.16	1.44	1.22	1.75	.50	.56

TABLE 67

Rank Order of
Adjusted Mean Change by Teaching Groups;
All Test Items Used; Prekindergarten
and Kindergarten; Israeli Group

Tests	Teaching Groups							
	Control		Discuss.		Observ.		Touch	
Grade level	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.
Cognitive drawing								
Level of drawing a recognizable figure	4	4	3	1	1	3	2	2
Number of concepts in drawing figure and ground	4	3	3	1	2	4	1	2
Level of cognitive performance in drawing	4	4	3	2	1	3	2	1
Sum of changes in 10 cognitive sub-scales	4	4	3	2	1	3	2	1
Level of overall cognitive performance in drawing	4	4	3	1	1	3	2	2
Artistic drawing								
Level of artistic performance in drawing	4	3	3	4	1	2	2	1
Sum of changes in 8 artistic sub-scales	2	4	4	3	3	2	1	1
Level of overall artistic performance in drawing	3	4	4	3	1	2	2	1
Related verbal								
Number of concepts in words for subject and setting	2	3	3	2	4	4	1	1
Drawing and verbal								
Number of duplicate concepts in drawing and words	3	3	2	2	1	1	4	4

TABLE 68

Summary Rank Order by Classes of Tests;
Adjusted Mean Change by Teaching Groups;
All Test Items Used; Prekindergarten
and Kindergarten; Israeli Group

Class of test	Teaching Groups							
	Control		Discuss.		Observ.		Touch	
Grade level	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.	Pre.	Kdg.
Five tests of cognitive ability in drawing	**4	4	3	1	1	3	2	2
Three tests of artistic ability in drawing	3	4	4	3	1	2	1½	1
One test of related verbal ability; number of concepts in words	2	3	3	2	4	4	1	1
All ten tests in the battery	**4	**4	3	2	1	3	2	1

Note: Where more than one test was included in a class, the ranks were summed and the sums were then ranked. The Kendall W was used to derive the significance of the difference in the ranks of the test in that class.

*Significant at .05
**Significant at .01

for the Israeli younger children, but also for the American younger children as subsequent data by rank orders will show.

3) Hypothesis L: data and interpretation

Hypothesis L: As between the two grade levels in the experimental groups, the prekindergarten children will show themselves able to do better, compared to kindergarten children, on cognitive drawing ability than on artistic drawing ability or related verbal ability.

American data: (Table 63) Taking as a standard for comparison, the ability of prekindergarten children to make gains equal to or greater than one half the gain of the kindergarten children, the hypothesis is confirmed. On the five tests of cognitive drawing ability, the prekindergarten children met the criterion in 16 of the 20 cells of comparison (80%). On the three tests of artistic drawing ability, the prekindergarten children met the criterion in five of the 12 cells of comparison (42%). On the one test of related verbal ability, the prekindergarten children met the criterion in one out of four cells of comparison (25%).

Israeli data: (Table 66) Taking the same standard (i.e., prekindergarten children making gains equal to or greater than one half the gain of the prekindergarten children), the hypothesis is confirmed. On the five tests of cognitive drawing ability, the prekindergarten children met the criterion in 12 of the 15 cells of comparison (80%). On the three tests of artistic drawing ability, the prekindergarten children met the criterion in but one of the nine cells of comparison (11%). On the test of related verbal ability, the prekindergarten children met the criterion in one of three cells of comparison (33%).

We take this data to be evidence that prekindergarten children make their first and primary gains in cognitive drawing ability. Gains in artistic drawing ability and verbal ability lag behind. By the kindergarten year, gains over the three categories of abilities are better balanced. An emphasis on cognitive development in drawing for the younger children would seem to be appropriate and important, anticipating that as the children come to be able to say what they know of objects in their environment by putting their knowings into drawings, they will have means and need to grow, also, in their artistic ability to draw and their verbal ability to make their knowings public and communicable as their drawings have come to be.

4) Hypothesis M: data and interpretation

Hypothesis M: As between the two grade levels, variation will show in the rank order of gains made by the five teaching groups; methods which are most productive for the prekindergarten children will not necessarily be the methods which are most productive for the kindergarten children.

American data: (Table 65) The hypothesis is not confirmed. On the rank order for the total battery of tests, the ranks of the teaching methods were identical for the two grades, i.e., both grades benefitted in the following order: Observation (first), Technique, Discussion, Touch, Control.

Some variation showed in the breakdown by classes of tests, but it was a variation of not more than one rank in cognitive drawing ability, and 1 1/2 ranks in artistic drawing ability. On the test of related verbal ability, the difference was marked: Technique, top for kindergarten children was bottom for prekindergarten children; Observation, top for prekindergarten children was third for kindergarten children.

Israeli data: (Table 68) The hypothesis is confirmed. On the rank order for the total battery of tests, the ranks for the two grades varied for all teaching methods except Control: for prekindergarten children, it was Observation (first), Touch, Discussion, Control; for kindergarten children, it was Touch (first), Discussion, Observation, Control.

On the breakdown by classes of tests, the variation was marked only in the cognitive drawing tests. There, two ranks separated the grades on two methods; Observation took first for prekindergarten children, with Discussion third; the reverse was the case for the kindergarten children. On artistic drawing and related verbal abilities, the differences were narrow, the separation between the ranks of the grades being not over one rank in either kind of test.

We interpret the American data as evidence that the grade level difference is not as crucial as the teaching method difference, and that the order of value of the methods is the same for the two grades, i.e., Observation, Technique, Discussion, Touch, Control. Taking the top three as methods to recommend, they would be Observation, Technique, and Discussion, in that order.

Interpreting the Israeli data at face value, the differences by grade appear sufficient to call for different orders of value as among teaching groups for the two grades. Modifying the face value of the prekindergarten results to account for the fact that Touch included elements of the Technique method (as practiced in America), we can see a parallel between American rank orders and those for Israeli prekindergarten children, i.e., for the Israeli prekindergarten children Observation, Touch (technique), Discussion as the top three, paralleling the American top three, Observation, Technique, Discussion.

For the Israeli kindergarten children, the rank order for the top three shifts to Touch (technique), Discussion, and Observation. Touch, as the broadest based method used in Israel, may have been able to lead at the kindergarten level because enough of the older children had passed threshold levels in cognitive drawing abilities to be ready to make broad-based gains in response to broad-based stimuli. Discussion, as the narrowest experimental method, may have been able to raise to second position in Israel for kindergarten children, when it plainly did

not do so for the American children, for a reason suggested by the data in the diagnostic study, i.e., as Israeli children mature, their verbal ability progressively matures. For the American children this was not found to be the case. As Israeli children became kindergartners, they were better able, compared to American kindergartners, to use words as the supporting foundation for the development of drawing abilities. Observation made the most radical shift in position as between the prekindergarten and kindergarten grades, i.e., from first on the former to third on the latter. We have no hypothesis to explain this shift apart from the hypotheses above which attempt to explain why Touch (technique) and Discussion came to be relatively high gainers, leaving Observation in third for the Israeli kindergarten children.

E. Concerning the Gains of the Teaching Groups Relative to the Two National Groups

1) Assumptions leading to hypothesis: We assume that American and Israeli preschool disadvantaged children will perform at approximately the same levels in response to the teaching methods. In both countries, the source of disadvantage is the same in the sense that in each case the children have come by a home culture which is not as directly fitted to the needs of children in a school setting as the home culture of advantaged families provide. The teaching methods and the testing instruments are focused on development of the children in those dimensions of their experience and behavior which helps to fill the gap between what the children come to preschool with, and what they need to have later to have success in school. The response to these teaching methods, and the scores on the tests representing gains as a result of teaching, should be approximately the same in the two countries.

This implies that the teachers in the two countries were equally prepared, able, experienced and responsive to the experimental necessities; it implies, also, that the experimenters were equally prepared, able, experienced and responsive to the two situations. These supporting assumptions we know not to be fully tenable, but the test of the basic assumptions in the study are better made with presuming approximately the same levels of gain for the two countries than to presume otherwise.

2) Hypothesis N: data and interpretation

Hypothesis N: As between the two national groups, the gains will be at approximately the same levels in response to comparable teaching methods.

The hypothesis is not confirmed (Table 69). In the Control group, the two countries did perform equally in the sense that they shared the lead on the ten tests very close to equally, i.e., tied on one, American children led on five, Israeli children led on four. But on the Discussion group, the American children led the Israeli children in every one of the ten tests, and on eight, they were twice as high in their gain as the Israeli children; again, on Observation, the American

TABLE 69

Adjusted Mean Gains by Teaching Groups;
All Test Items Used; Grades Combined;
Comparing the Two National Groups

Test	Teaching Groups							
	Control		Discuss.		Observ.		Touch	
National group	Am.	Is.	Am.	Is.	Am.	Is.	Am.	Is.
Cognitive drawing								
Level of drawing a recognizable figure	.10	-.01	.61	.25	.84	.31	.53	.42
Number of concepts in drawing figure and ground	.11	.45	2.21	1.04	2.96	.76	1.98	1.50
Level of cognitive performance in drawing	.22	.22	1.11	.45	1.53	.77	1.02	.83
Sum of changes in 10 cognitive sub-scales	.58	.21	3.49	1.60	5.20	2.40	3.03	3.11
Level of overall cognitive performance in drawing	.17	-.03	.87	.56	1.27	.63	.73	.69
Artistic drawing								
Level of artistic performance in drawing	.17	.09	.78	-.02	1.02	.42	.49	.66
Sum of changes in 8 artistic sub-scales	-1.14	-.15	2.56	-.63	3.58	1.72	2.53	4.23
Level of overall artistic performance in drawing	-.22	-.05	.78	-.09	.88	.51	.80	.84
Related verbal								
Number of concepts in words for subject and setting	.88	.59	3.07	.51	3.60	-.09	1.06	1.70
Drawing and verbal								
Number of duplicate concepts in drawing and words	-.06	1.05	1.46	1.30	2.41	1.49	1.23	.54

children led in every one of the 10 tests, and on eight, they were twice as high in their gain as the Israeli children. On Touch, the two groups were again equal in the sense that the American children led on five of the 10 tests, and the Israeli children led on five. The Touch group, which in Israel also included some elements of the Technique group (as practiced in America), became competitive with the Touch group in America. It was the only experimental method to do so.

Attending not to the size of the mean gains, but to their rank order in the respective countries (Table 70), Touch, on the total battery, was the best among the experimentals in Israel but least effective among experimentals in the United States. This difference obtained not only for the total battery but also for each of the three kinds of ability tested; the contrast was complete.

Observation, ranking first for the American children on the total battery and on each of the three abilities tested, was in second rank for the Israeli children on the tests of the two drawing abilities. Observation, therefore, served comparatively well in both countries in the development of both cognitive and artistic drawing abilities. In verbal ability, Observation also served American children well, ranking top for them; however, for Israeli children, Observation ranked bottom and below Control.

With the Technique method excluded from Table 71, Discussion ranked second for the American children (next to Observation) in the total battery and in all three abilities. For Israel, Discussion was the least effective of the experimental methods on the total battery and on each of the three abilities.

We conclude on the data by saying that the two countries had different levels of gain in response to the methods employed, and had different rank order patterns in which the methods produced gain. The hypothesis is therefore not confirmed. (One thread of similarity remains in that Observation, top for the American group, was second for the Israeli group in the drawing tests).

We interpret the difference in level of gain to point attention to two operating facts: (1) the teachers of preschools in Israeli are two year normal school graduates whose training is not as complete as that received by the four year college graduates who serve in America; (2) the experimenter who worked in the field in Israel and also in America was much better prepared to function with clarify and conviction in the American situation than in the Israeli situation. It was in Israel that the experimenter worked out the methodology and design; when coming to America, she had not only the experience but also the raw data on results which she had been able to review in confirmation of the fact that the program was working, both for the children and the teachers. In the American setting, she was able to operate with surety and dispatch; this could have been a major element in communicating to American teachers the values they could expect to derive from the experiment.

TABLE 70

Rank Order of
Adjusted Mean Gains by Teaching Groups;
All Test Items Used; Grades Combined;
Comparing the Two National Groups

Tests	Teaching Groups							
	Control		Discuss.		Observ.		Touch	
National groups	Am.	Is.	Am.	Is.	Am.	Is.	Am.	Is.
Cognitive drawing								
Level of drawing a recognizable figure	4	4	2	3	1	2	3	1
Number of concepts in drawing figure and ground	4	4	2	2	1	3	3	1
Level of cognitive performance in drawing	4	4	2	3	1	2	3	1
Sum of changes in 10 cognitive sub-scales	4	4	2	3	1	2	3	1
Level of overall cognitive performance in drawing	4	4	2	3	1	2	3	1
Artistic drawing								
Level of artistic performance in drawing	4	3	2	4	1	2	3	1
Sum of changes in 8 artistic sub-scales	4	3	2	4	1	2	3	1
Level of overall artistic performance in drawing	4	3	3	4	1	2	2	1
Related verbal								
Number of concepts in words for subject and setting	4	2	2	3	1	4	3	1
Drawing and verbal								
Number of duplicate concepts in drawing and words	4	3	2	2	1	1	3	4

TABLE 71

Summary Rank Order by Class of Test
Adjusted Mean Change by Teaching Groups;
All Test Items Used; Grades Combined;
Comparing the Two National Groups

Class of test	Teaching Groups							
	Control		Discuss.		Observ.		Touch	
National group	Am.	Is.	Am.	Is.	Am.	Is.	Am.	Is.
Five test of cognitive drawing ability	**4	**4	2	3	1	2	3	1
Three tests of artistic drawing ability	**4	**3	2	4	1	2	3	1
One test of related verbal ability: number of concepts in words	4	2	2	3	1	4	3	1
All ten tests in the battery	**4	**4	2	3	1	2	3	1

Note: Where more than one test was included in a class (1) the ranks were summed for each teaching group and the sums were ranked, and (2) the Kendall W was used to derive the significance of the difference in ranks as among the tests in that class.

**Significant at the .01 level for the low

The difference in rank order of gains by teaching methods is more difficult to explain. In Israel, the Touch method was a mixture of two methods; Touch and Technique. The Technique contribution could have accounted for the margin of gain held by the Touch method in Israel. In America, Touch was relatively "pure"; it was loaded with stimulus cues compared to the strength of response it could help the children generate. An object touched and held by hand is not easier to draw unless the children are taught how to convert what they feel into what can then be drawn as a visual form. In the Israel experiment, some of this kind of help was offered children in the Touch group; in America, it was not. Along these lines a hypothetical explanation for the difference between the two national groups may be offered concerning their response to the Touch method.

Discussion, in Israel, was low, especially in artistic abilities where the mean gains were not gains but losses. In other abilities, the gains on the method were also low. The method did not seem to catch on in Israel. It did catch on in America, coming into second rank among the American methods (when Technique is excluded from consideration). As the pre-test data show, the American children had more words to use as names for features of the objects to also be drawn; compared to the Israeli children, the American children may have had enough such names to have reached a threshold level to make the Discussion method productive in America when it could not yet be so in Israel.

As already noted, Observation did catch on in both countries. The Observation method, focusing on visual form of objects at a distance, put the emphasis on getting to know the objects in ways a drawing could reflect. It is a better balanced method than Touch in respect to proportions of energy spent on receiving stimulation and expressing its meaning. It is a better balanced method than Discussion in that it uses visual differentiation in the stimulus as well as in the response while Discussion attempts to use verbal differentiation in the stimulus to provoke visually monitored response in the drawing done. Observation, according to this hypothesis, should be efficient for use in the time span allowed. Such seems to have been the case.

Notwithstanding the differences in the gains patterns of the two national groups with respect to the comparable teaching methods, it is instructive to note how often the hypotheses advanced in previous sections of this chapter were supported when each national group was held within its own frame of reference.

Summary Interpretations: Hypotheses F through N

(1) The traditional method of using drawing in preschools, presuming non-intervention by the teacher in the drawing acts of the children, does not develop disadvantaged preschool children. It does not develop

cognitive abilities in drawing or artistic (affective) abilities in drawing. It may help disadvantaged children develop their verbal abilities as it appeared to do in the Israeli experiment, but this is not borne out for American disadvantaged children. Experimental methods, based on teacher intervention in the drawing acts of children, do develop disadvantaged preschool children in their cognitive drawing abilities, their artistic drawing abilities, and related verbal abilities. The primary question is not whether non-intervention or intervention is best; it is only which mode of intervention is most productive. (Relative to Hypothesis F).

(2) The most effective methods of intervention are those which, for a given level of development of the children, provide the best balance between quantity and kind of input (stimulus support) and quantity and kind of output (response support). This appears to be the principle best explaining the American results; it also helps to explain otherwise ambiguous data from the Israeli experiment. The problem is not that of determining what saturation of stimulus support is best or what facilitation of response support is best, but that of determining what stimulus support to provide in relation to what response support to provide in order to have an effective and fulfilling inter-fit. (Relative to Hypothesis G).

(3) Preschool disadvantaged children will sensitively respond to the specific kind of teaching they are offered; when a given method is focused to produce gains primarily in given abilities, the children will show primary gains in those given abilities. The design of teaching has a direct effect on the kind of learning achieved. The problem therefore becomes not which single method to use constantly, but which succession of methods to use over time to bring about the successive development of abilities which, in their interrelation, provide best incremental support to overall development. (Relative to Hypothesis H).

(4) Preschool disadvantaged children do not benefit from traditional methods of using drawing in preschool teaching because they cannot determine what they have been taught (been supported in learning) as distinguished from what they have not been taught (not been supported in learning). They can benefit from methods of using drawing in teaching when they can determine what they are supported in learning; they will transfer their learning to new problems not yet taught according to the support they have received in learning from the problems they have been taught. The problem is not how to get transfer generally, but how to provide specific kinds of support with sufficient clarity to enable the children to recognize what they can do in meeting problems, old or new. (Relative to Hypothesis I).

(5) Highest efficiency in transfer comes from methods most carefully designed to relate quantity and kind of stimulation to quantity and kind of response. When the response is to come in drawing form, the methods

which are most highly efficient are those which put the emphasis on visual form since drawings are made primarily as visual forms. Technique is relatively efficient in transfer since it focuses the child's attention on visual forms that can be made by the child in his drawing; Observation is relatively efficient in transfer since it focuses the child's attention on visual forms observable in models of the subject the child is to draw. When the goal is cognitive development of the children in their learning about objects in their environment, Observation is better than Technique. When the goal is artistic development of the children in their learning how to act through drawing, Technique is better than Observation. When the goal is inter-supportive development of cognitive and artistic abilities in drawing, the use of both Technique and Observation are best, each offered for its own emphasis in rhythmic succession. The problem is not which method to use constantly, but which succession of methods to use, inter-supportively, for the goal in mind. (Relative to Hypothesis J).

(6) Disadvantaged children of kindergarten age are able to make greater gains from the experimental teaching methods than disadvantaged children of prekindergarten age. This is the general finding. At prekindergarten age, the children are just beginning to learn to draw forms which have a recognized relevance to forms appearing in the features of objects used as subjects for drawing. They are just beginning to learn to use words as formal descriptors of features of those objects. At kindergarten age, many of the children have already developed rudimentary levels of drawing and verbalization in relation to features of objects in their environment and are therefore able to respond to the teaching with more obvious and wider ranging kinds of gain.

There are, however, instructive exceptions. When a method suitably fits the prekindergarten children and is well executed, it is possible for prekindergarten children to surpass kindergarten children in the gains made. This tells us that prekindergarten children can, in a relatively short period (10 weeks of three one-half hour sessions per week in this particular experiment), come to levels of performance which can advance their development by a year. With such a developmental potential, their growth with continued appropriate teaching through their prekindergarten and kindergarten years could reach levels which ought to approximate what advantaged children are presently able to do upon entrance to first grade.

Drawing has a potential for preschool disadvantaged children which is not now tapped and which could make a significant difference in the chances these children might have to succeed in school tasks during the early elementary school years. The problem is not with the potentiality of the children; it lies with the potentiality of adults to provide what the children can developmentally respond to. (Relative to Hypothesis K).

(7) Cognitive development in drawing is an essential for preschool disadvantaged children who are just beginning to learn to draw. In the absence of an ability to draw forms they can recognize as representative

of objects in their environment, they have no way to realize drawing as a way of establishing working relations with their environment. Lacking that connection, they have no enduring reason to pursue drawing as an important and fulfilling act. Lacking that, artistic development dies with the death of drawing itself. Cognitive development in words can then gain from drawing no extra scaffolding on which to build its form of knowing. Cognitive development is therefore essential as a first emphasis. As threshold levels of drawing recognizable forms are reached, artistic and related verbal development can also progress.

Drawing is a creative act by which a child can, by drawing the form of an object, come to own his comprehension of that object as his own, and at the same time, come to own himself as capable of comprehending. He can experience something in the world to be learned, and himself as someone learning it. He can gain a sense of communion (common union) with his environment, a way to belong in his world and a way to have his world belong in him; drawing is a way of making the fitting connections. He has reason to search for what "is," to establish the givens of the big world he is in, and also a way of going about his taking of the givens to make of them something indubitably his own. Drawing is an elementary process, transactional and suited to promote development. The cognitive aspects are essential to it. The problem is not how to protect the artistic from the cognitive, as presumed in traditional methods of teaching, but rather that of how to introduce the cognitive so that the artistic may also come to be. After threshold levels have been reached, the problem then is how to use and promote each as the developer of need for growth within the other. (Relative to Hypothesis L).

(8) As the experiment was conducted, prekindergarten and kindergarten classes were both involved at the level they had reached under conditions of traditional uses of drawing in teaching (as the experimental programs began). In the interval of the year separating the older grade from the younger, the older grade had not had the benefit of teaching methods which were specifically aimed at developing the abilities tested, and so had a response to the tests, which when compared to the response of the prekindergarten children, was similar in overall pattern. The gains of the older grade were greater, but the rank order of gain by teaching methods for the two grades was the same for both grade levels in the American experiment. Both benefitted most from Observation and Technique. For the Israeli prekindergarten children, the response was similar to that of the American children. For the kindergarten children in Israel, there was a shift showing more benefit from the Touch (technique) and Discussion methods than had been shown otherwise.

The question one wants to answer is what methods would turn out to be most beneficial for the older grade if the older grade had had a prior year of teaching by the experimental methods. Would Observation and Technique still be the preferable methods, or would it turn out as

the Israeli kindergarten data on rank orders, and the diagnostic data on verbal development with age in Israeli children hint, that other and "richer" methods would come to be most beneficial?

We can only speculate from the data at hand, but speculating, we would predict "richer" methods would be needed. By "richer," we mean to imply an increased range of differentiation in the stimuli accompanied by an increased (balanced and related) differentiation in the response capability. Observation and Technique, used in sequence and rhythmically to alternatively emphasize perception of visual forms in the environment and creation of related visual forms in the drawing, should lead to a level of integral functioning in respect to visual differentiations which would be reliable enough to allow for the progressive inclusion of stimuli and response capabilities which introduced other, more subtle, forms of differentiation--particularly those of feeling and movement.

Feeling, in reference to objects in the environment, refers to how objects feel in the hands; feeling, in reference to internal states of being, refers to how the child feels about himself and his world as he is experiencing the process of making the drawing. Movement, in reference to objects in the environment, refers to the kinesthetic experience of their spacial proportions and arrangements; movement, in reference to internal states of being in the child, refers to the development of emerging composition of the drawing as it is being done. Both feeling and movement would increase the overall capacity of the child to draw artistically and to include in his drawing ever more refined knowings of himself and his world.

While development of drawing capability was being thus promoted, there should also be sufficient strength and opportunity to include an accompanying differentiation by words. Territory of knowing as it was occupied by drawing should also be a territory of knowing as occupied by relevant words (insofar as duplication is possible). Transfer across media should be more readily challenged, and with that accomplishment should come quite substantial growth in the abilities children need for their school tasks in ensuing years. Kindergarten children, after having had a year of development in drawing through the use of Observation and Technique, should be able to benefit, therefore, from differentiations by feeling and movement in relation to drawing and by relating words thereto.

In the methods of Touch and Discussion which were included in our present experiment (as shown most fully in the American design) were the seeds for methods which could become important in helping kindergarten children grow from the levels they might achieve had they had a year of teaching in prekindergarten which was focused on development of their drawing capabilities. The fact that these two methods had relatively low ranking, compared to Observation and Technique in the American setting, is not to be interpreted as meaning they should therefore be

discarded as usable methods. Rather, the point would appear to be that their value was not yet fully realizable until development of drawing ability had reached a more advanced stage. The problem is not what methods are forever right, but what methods are appropriate as development proceeds. We anticipate that richer editions of Touch and Discussion than we have at present provided will be needed once the kindergarten children have had a year of appropriate teaching behind them. (Relative to Hypothesis M).

(9) The development of children is dependent on the development of those who attend them. The development of those who attended them, in this instance, depended in turn on the development of a project, which in turn, depended on the development of new teaching methods and new instruments within the context of new associations of personnel to get the "development" done. The fact that the Israeli children made lower gains than the American children in response to comparable teaching methods is to be interpreted less with reference to the children than with reference to the stage of development of the project and what that represented in the correlate stage of development of the participants.

It was in Israel that the project was conceived and developed to a level making trial in the United States possible. As with children there are threshold levels of knowing; so also for experimenters. It is not until there is proven competence-to-do that one has passed his threshold necessity. It was not until the experiment in Israel was run and the raw data were available from the children's work and from the teacher's reactions that there could be the knowing of "threshold passed." The raw data was convincing. Those adults who had participated in the Israeli experiment could say to themselves only "it might work"; those adults who participated in the American setting could say "it has worked and it will work if we only work it right."

What the experimenters brought to the two situations by way of overall address to its possibilities was doubtless "significantly different" (if there had been a way to measure the difference). In addition, the teachers in Israel had two years of teacher training to learn to do what teachers in America had four years to learn to do.

Rather than interpret the test data to mean the Israeli children were less able, or that the Israeli teachers were less able, or that the teaching methods were in some ways unknown (as well as in some ways known) not the same, it is better to say to Israeli children and teachers alike, "thanks for the threshold passed; thanks for the gift of the known." (Relative to Hypothesis N)

PART IV - CONCLUSION

Chapter IX presents a capsule summary of the project operations, a digest of interpretations of the findings, a listing of the contributions, and a set of realizations and recommendations derived from experience in the project. The intent is to give the reader as much of the meaning of the project as can be offered apart from involvement in detail.

CHAPTER IX
SUMMARY: OPERATIONS, INTERPRETATIONS, CONTRIBUTIONS, RECOMMENDATIONS

A. Capsule Summary of the Project Operations

Preschools officially designated as primarily enrolling disadvantaged children were identified in the city of Tel-Aviv, Israel, and the city of Columbus, Ohio. By random selection, preschools were assigned in separate regions within these cities to experiment with newly devised ways of using drawing for cognitive development. The teachers in these schools, without selection, became the teachers who conducted the experimental teaching. All children in the selected preschools were taught by the assigned methods for a period of 10 weeks, three one-half hour sessions per week. From the children taught, a random selection was made of the research sample to be used in testing. A battery of 10 newly devised tests (in addition to the Harris-Goodenough Draw-a-Man Test for IQ) was used to measure cognitive development in drawing, artistic development in drawing, and related verbal development. Pre-test data from six of the 10 tests were used for a diagnostic study of the abilities of the children and the teachers. Data from the full battery were used for assessing the effect of the five teaching methods used in Columbus and the four teaching methods used in Tel-Aviv.

The number of classrooms involved in Columbus was 20; the number of children taught was 506; of this number, 262 served as the research sample. In Tel-Aviv, 32 classrooms were involved; the number of children taught was 976, of which 188 served as the research sample. The proportions of prekindergarten and kindergarten children were approximately equal in each of the national research samples.

The five teaching methods used in Columbus were Control (the traditional way of using drawing in preschools), Discussion (talking about subjects being drawn), Observation (looking at objects used as subjects for drawing), Touch (touching and handling models being drawn), and Technique (children taught techniques of drawing). The key name for each of the experimental groups describes its emphasis, but, except for Discussion, does not describe an exclusive mode of involving the children; i.e., Discussion depended on discussion, but Observation included some discussion, Touch included some discussion and observation and Technique included some discussion and observation.

The four teaching methods used in Israel were the first four listed for the American group; the fourth group, Touch, was different from its American counterpart in that it included, in addition to Touch, some aspects which, in the American experiment, became systematized into the Technique method.

In the Control groups, the teacher did not intervene in the drawing acts of the children; in the experimental groups, the teachers intervened in designed ways, primarily to promote cognitive development in drawing with supplementary goals of artistic and verbal development.

The curriculum for the teaching of drawing was the same for all the experimental groups in the sense that all used the same drawing themes, and in the same order, for each week of the 10 weeks. With the curriculum the same, the data on effects of the teaching methods could more readily reflect the consequences of the teaching per se.

Nine of the 10 new tests employed drawings as the basis for judgment. In Columbus, five test drawings were used (man, house, tree, TV set, and "combination" of man-tree-house). In Tel-Aviv, three test drawings were used (man, house, and radio set). The tenth test used words about the objects taken as subjects for drawing; in Columbus, words about four test objects (man, tree, house, and TV set), and in Israel, words about one test object (man).

Five of the 10 tests were different ways of measuring cognitive development in drawing; two were scored by preschool teachers, and three were scored by art teachers. Three of the 10 tests were different ways of measuring artistic development in drawing; all were scored by art teachers. One test was of verbal concepts used to describe objects also drawn, and one test was of "duplicates," i.e., concepts expressed by a child both in his drawing of a given subject and in his verbal description of that subject; these two tests were scored by research assistants (though they could readily be scored by classroom teachers).

The project had its origin in experience which indicated (1) that disadvantaged preschool children had much the same difficulties in catching on to learning in the Israeli setting as they had in the American setting, (2) that cognitive development was essential if these children were to have later success in school, and (3) that drawing offered a way to teach for cognitive development, though traditionally, drawing had not been so used in either the United States or Israel.

Pursuing these lines of thought, a theory of "disadvantage," of "cognitive development," and of "drawing as a means of teaching preschool children for cognitive development" was worked through to form the conceptual base for the program. Proceeding from this base, the teaching treatments and the tests were accordingly designed; five major hypotheses were formulated to guide the diagnostic study, and nine major hypotheses were formulated to guide the assessment of the teaching procedures. The data and interpretations were presented in relation to the hypotheses, and summaries of the interpretations were offered at the close of diagnostic and assessment studies.

Following is a digest of the summary interpretations, first for the diagnostic study and second for the assessment of the teaching procedures.

B. Digest of Interpretations of the Findings

1) Digest of the summary interpretations of findings from the diagnostic study of preschool disadvantaged children (Chapter V; Hypotheses A through E).

(a) Preschool disadvantaged children have a beginning discipline to bring to their learning; they have a "generalized drawing capability," i.e., they tend to try to draw each subject at the level they can draw when satisfaction with the process is greatest. Drawing is therefore a medium advantageous to use when the aim is to learn about one subject after another, i.e., to develop cognitively.

(b) Disadvantaged preschool children exercise two interrelated abilities in their drawing: one a cognitive ability to recognize forms existing in their environment or in their drawing (noun), and the other an affective ability to recognize themselves as actors affecting the world by what they can do in their drawing (verb). The capacity to affect the world by forming a drawing in it is invitation to differentiate the environmental forms to which forms in the drawing can refer, and vice versa, the capacity to differentiate forms known to be in the environment is invitation to integrate those forms into the known and expressed within a drawing. Development of the child, generally, involves his better relating himself to the world, and better relating the world to himself. Drawing is a medium which exercises the transaction in both directions and in interrelation.

(c) Disadvantaged preschool children may develop a generalized drawing capability apart from development of a generalized verbalizing capability. Whereas the American children were able to conceptualize across subjects in drawing and reach significance levels of correlation, they were not able to conceptualize across subjects in words and reach significance levels.

(d) Apparently, children do not develop conceptualization in general; rather, they tend to develop conceptualizing capacity within the framework of the outlets available to them for expression. In drawing, they appear able to sense the process of drawing as a process; this gives them the power to take one subject-to-be-known after another as though each, in turn, was to be handled within that process. This enables generalization across subjects. In verbalizing, they were not yet able to sense a process by which to deal with one subject after another; their verbal concepts were still subject-bound. This affirms that the development of cognitive ability is related to the media of expression with differential rates for the different media.

(e) The ability to express concepts "across media" offers a wider growth potential than the ability to express concepts in one medium. Preschool disadvantaged children, when able to do well in expressing the same concepts in both drawing and words, are able to do well in

expressing concepts in either drawing or words (whether the same concepts or not). The ability to do "duplicates" tends to generalize across subjects, meaning that the ability to generalize across the two media tends to mean the ability, also, to generalize within either medium. Significant correlations between "duplicates" and IQ scores indicates that the ability to express concepts across media is related to potential for later school success.

(f) Disadvantaged preschool children in the two national groups tend to respond in similar ways to tests of drawing ability and tests of ability to express concepts in both drawing and words, but they tend to diverge on tests of verbal development. Overall, the similarities are much more extensive than the differences; the similarities support the assumption that a teaching program which would succeed in developing disadvantaged preschool children in either setting would be a good candidate to prospectively succeed in the other. The differences warn, however, that it is better to know the specifics than to be left to the mercy of assumption alone.

(g) The differences between the two national groups suggest, in this instance, that American teachers have a problem which Israeli teachers do not have so acutely, i.e., that of getting children's talk to become functionally relevant to cognitive development, both in a verbalizing medium and in relation to visual media. The American setting seems to separate the visual from the verbal in a way the Israeli setting does not, meaning that teaching of the American children needs to be directed more pointedly at the developmental integration of the two than would be indicated for the Israeli setting.

(h) Teachers of preschool disadvantaged children are quite capable of evaluating the drawings of their children as these evaluations are needed in a program of fostering cognitive development through drawing. Preschool teachers can judge the cognitive content in the drawings by relatively simple techniques, and by use of these measures, they can make judgments of cognitive content which correlate well with judgments of psychologists in scoring drawings for IQ, or judgments of art teachers in scoring drawings for either cognitive or artistic content.

(i) Preschool disadvantaged children, just beginning to draw, need some way of knowing what they are accomplishing; they need confirmation of the value of their efforts; they need to know what is good about what they have done and what would be better if they could do it in their next drawing; they need to communicate to others, to say something having meaning and value; they need their messages to be "read." Preschool teachers can meet these needs; they have the capacity. And the children have the chance to learn something of inestimable value, i.e., what "learning" feels like, and what the conditions are that make the learning experience possible, satisfying to self and to others. On such knowing, development in school and in the modernizing society depends.

2) Digest of the summary interpretations of findings from the experiment with varied teaching methods (Chapter VIII; Hypotheses F through N).

(a) The traditional method of using drawing in preschools, presuming non-intervention by the teacher in the drawing acts of the children, does not appreciably develop disadvantaged preschool children.

(b) Methods of teaching, presuming intervention by the teacher in the interest of communicating with the child, can use drawing to develop preschool disadvantaged children when the methods are carefully designed to promote specific kinds of development.

(c) The most effective methods of intervention are those which, for a given level of development of the children, provide the best balance of support between quantity and kind of input (sensory stimulation) and quantity and kind of output (response capability).

(d) Preschool disadvantaged children will sensitively respond to the specific kind of teaching they are offered; when a given method is focused to produce gains primarily in given abilities, the children will show primary gains in those given abilities; the design of teaching has a direct effect on the kind of learning achieved.

(e) Preschool disadvantaged children do not benefit from traditional methods of using drawing in preschool teaching because they cannot determine what they have been taught (been supported in learning) as distinguished from what they have not been taught (not been supported in learning); they can benefit from methods of using drawing in teaching when they can determine what they are supported in learning.

(f) Preschool disadvantaged children will transfer their learning to new problems not yet taught according to the support they have received in learning from the problems they have been taught; the problem in teaching is not how to get transfer generally but how to provide specific kinds of support with sufficient clarity to enable the children to recognize what they can do in meeting problems, old or new.

(g) Highest efficiency in transfer comes from methods most carefully designed to relate quantity and kind of stimulation to quantity and kind of response; when the response is to come in the form of drawing, the methods which are most highly efficient are those which put the emphasis on visual form since a drawing is made primarily as a visual form.

(h) The methods of Observation and Technique are relatively efficient in transfer since both focus on visual form, the former on visual form in objects in the environment, the latter on visual form as it is being produced in the drawing.

(i) When the goal is cognitive development of the children in their learning about objects in the environment, Observation is preferred over Technique; when the goal is artistic development of the children in their learning how to act through drawing, Technique is preferred over Observation.

(j) When the goal is inter-supportive development of cognitive and artistic abilities in drawing, the use of both Observation and Technique are preferred, each offered alternatively in rhythmic succession to allow each its supportive emphasis on its way to needing the other.

(k) The problem in designing appropriate teaching is not which single method to use constantly, but which succession of methods to use over time to bring about the successive development of abilities which, in their interrelation, provide best incremental support to overall development.

(l) Where traditional methods of using drawing in teaching disadvantaged preschool children have been used at both grade levels, and methods of using drawing for cognitive development are then introduced, kindergarten children will generally be able to make greater gains from the teaching than prekindergarten children will be able to make. Prekindergarten children will generally be just beginning to learn to draw forms which have a recognized relevance to forms appearing in the features of objects used as subjects for drawing; at kindergarten age, many children will have passed or will soon be able to pass threshold levels of drawing recognizable forms and will therefore be able to make gains which are more obvious and wider ranging than prekindergarners can generally make.

(m) When, however, a method suitably fits the prekindergarten disadvantaged children and is well executed, it is possible for these children to surpass disadvantaged kindergarten children in the gains made. This tells us that prekindergarten children have a high developmental potential, which if capitalized upon throughout the prekindergarten year and the kindergarten year, could reach levels which ought to approximate what advantaged children are presently able to do upon entrance to the first grade.

(n) Drawing has a potential for preschool disadvantaged children which is not now tapped and which could make a significant difference in the chances these children might have to succeed in school tasks during the elementary school years.

(o) The problem is not with the potentiality of the children; it lies with the potentiality of adults to provide what the children can developmentally respond to.

(p) Cognitive development in drawing is an essential for preschool disadvantaged children who are just beginning to learn to draw. In the

absence of an ability to draw forms they can recognize as representative of objects in their environment, they have no way to realize drawing as a way of establishing working relations with their environment. Lacking that connection, they have no enduring reason to pursue drawing as an important and fulfilling act. Drawing dies as a worthy engagement.

(q) Affective development through drawing is therefore not possible to disadvantaged preschool children apart from their initial development of cognitive ability in drawing; once threshold levels of drawing recognizable forms are reached, artistic development is also possible. Thereafter, with teaching support, artistic development can stimulate cognitive development and cognitive development can stimulate artistic development.

(r) Though Observation and Technique were top ranking methods for both prekindergarten and kindergarten children under the conditions of the experiment, it is probable that richer methods would prove valuable in the kindergarten year, were Observation and Technique to be used throughout a full prekindergarten year. Observation and Technique, used in sequence and rhythmically to alternately emphasize perception of visual forms in the environment and creation of related visual forms in the drawing, should lead to a level of integral functioning in respect to visual differentiations which would be reliable enough to allow for the progressive inclusion of stimuli and response capabilities which introduced other, more subtle, forms of differentiation--particularly those of feeling, movement, and verbalization.

(s) Feeling and movement (tactile and kinesthetic sensation) were used as primary in the experiment with the Touch method; verbalization was used as primary in the experiment with the Discussion method. Touch (in the American version) and Discussion proved less productive of gains than Observation and Technique, probably because the children had not yet sufficiently strengthened their ability to handle visual forms essential to the medium of drawing. With a year of prekindergarten given to strengthening visual differentiation, kindergarten children might well be ready for enriched versions of Touch and Discussion.

(t) The development of children is dependent on the development of those who attend them. In the instance of this project, the adults (experimenters and teachers) were better developed for attending the children in the American setting than in the Israeli setting, and the American children gained more than the Israeli children. In Israel, the project was founded and carried through its initial threshold levels; adults there could say "it might work" but not yet "it did work"; in America, adult participants could say "it has worked and it will work if we work it right."

C. Contributions

Having in mind those who wish to know the meaning the project might have for prospective operations in their own settings, we list the

following contributions by evidence, by teaching method, by test instruments, and by conceptualization.

1) Contributions by evidence

(a) Evidence that preschool disadvantaged children in two national settings, widely separated by geography and cultural history, have much the same pattern of response to teaching methods and tests which are designed to help children develop the abilities requisite to success in school in a modernizing society. The inference extending beyond Israel and America is that countries having modernizing trends can share in their development of treatment methods for their disadvantaged populations. Seen so, the findings and rationale of this experiment have relevance not alone to the two specific national contexts in which the experiment was done, but prospectively, to other nations significantly involved in modernization. Granted potential applicability across culturally different modernizing nations, there should be applicability, as well, across communities having concentrations of disadvantaged populations within any given modernizing nation. These methods should be potentially applicable across such communities in the USA.

(b) Evidence that cognitive development is an appropriate aim for preschool education of the disadvantaged, and that its pursuit, rather than being detrimental to affective (artistic) development, is instrumental to it; cognitive and affective development are inter-twined in child development. The inference from this experiment is that disassociation of the two would be detrimental not only to the disadvantaged child, but to the advantaged child as well; preschool education needs be designed with an integrating interplay of both cognitive and affective development in mind.

(c) Evidence that drawing is a good vehicle for cognitive development of preschool disadvantaged children, and that when cognitive development is thus pursued, drawing brings with it the opportunity and need for affective development as well. Drawing, when introduced as means to increasing the child's knowledge of his environment is means, as well, to increasing the child's knowledge of himself as actor in relation to that environment, able then to use drawing in developing an increasingly competent and fulfilling inter-fit. Drawing, being an art form, time-tested as a means to man's development, is appropriate as means, again, to child development. The inference, untested here but evident in what results when one art form is used to gain its elementary benefit, is that art forms, as a class, provide a means which may well be the best we have for nurturing child development, provided the emphasis is on the rudimentary functioning of each as elemental to a child's growing competence to know his world and his relevant ability to transact with it, fulfillingly. Preschool education may develop best by turning to the arts to work out more consciously and systematically what each provides as means to child development.

(d) Evidence that when appropriate methods are used in well developed form (American data), the use of drawing can, in 10 weeks of

three one-half hour sessions per week (15 clock hours), produce the following gains: an increase in IQ of 16 points (from 85 to 101 on Harris-Goodenough Draw-a-Man Test); an increase in ability to draw a recognizable figure from an initial level of scribble with some (as yet unrecognizable) form to a level of form recognizable by the teacher who knows the subject intended and often to a level recognizable by an outsider who does not know the subject intended; an increase by one-half to three-fourths in the number of concepts (recognizable features) entered in their drawings; an increase by two-thirds to doubling in the number of concepts expressed in words about features of the objects also used as subjects for drawing; an increase by doubling in the number of duplicate concepts, i.e., concepts appearing in both drawing and words; and an increase by one to one and a half levels in overall artistic performance, using a six level scale.

(e) Evidence that preschool disadvantaged children are sensitively responsive to the kind of teaching they receive, showing varied response fitting to the varied teaching methods used; they are not unable to quickly learn. At bottom, the problem is not with the potentiality of the children; rather it lies with the potentiality of the teaching to offer what the children can developmentally respond to.

(f) Evidence that regular preschool teachers of the disadvantaged, not selected, can do the teaching that produces gain, provided they are supported in their development in the same spirit and with the same attention to the specifics of teaching as their children, in turn, require of them for their development. The development of children is dependent on correlative development of those who are to teach them. No "methods" will liberate children which do not, concurrently, liberate their teachers, and no experimentation will liberate the teachers which does not, concurrently, liberate the experimental initiators. The potential strength of the "applied research" situation is that it requires a testing of the complete chain of those successively involved in the experiment, the final measurement being of those, the children, for whose benefit the whole is aimed. Success depends on consistency of human interplay with feedback communication running freely through the chain of echelons to keep the whole within a discipline. Evidence of the children's growth is all we have as "recorded evidence" of the validity of this principle, but apart from it, we have no methodologies to recommend.

(g) Evidence that, granted the foregoing as the governing human discipline, and granted the level of worked-out conceptualization, pre-testing, and specificity of plan attained for the American experiment, the launching of a teaching program of this kind can be done within the time frame of a one-week workshop for the supervisors of the teachers to be engaged, followed by a one-week workshop for the teachers, with supervisors attending and leading, the teaching programs then launched and live weekly contacts maintained for a period of 10 weeks. This assumes regular personnel, not selected, and it assumes, also, an initiator who understands, values, and is fulfilled by the creative operation of the plan throughout its echelons.

2) Contributions by teaching methods

Four distinct methods of using drawing for teaching preschool children were developed. In contrast to the traditional method of using drawing, which presupposes non-intervention by the teacher, primarily in behalf of affective development, the four experimental methods presumed teacher intervention, primarily in behalf of cognitive development. What differentiated among the experimental methods was the kind of sensory stimulation emphasized, and the range of kinds of stimulation included in the method.

The Discussion method emphasized talk about the subjects to be drawn prior to, during, and after the drawing was done, depending on the children's memory of the subjects to be drawn.

The Observation method used discussion in a supplementary way but emphasized observation of objects to be used as subjects for drawing.

The Touch method used both discussion and observation in a supplementary way but emphasized the children's touching and handling of the objects to be drawn.

The Technique method used both discussion and observation in a supplementary way but emphasized the children's learning of techniques of drawing shapes that recurrently appear in objects to be drawn.

These methods are described in more detail in Chapter II, Section C, and in Chapter VII, Section B. They offer ways in which teachers can experiment to enrich their repertoire of means to promote cognitive and affective development.

3) Contributions by test instruments

Ten newly devised tests were created, five being different ways to measure cognitive development in drawing, three being different ways to measure artistic development in drawing, one to measure related cognitive development in verbal expression, and one to measure "duplicates," i.e., concepts appearing both in drawing and in words about the same subject.

All may be used as instruments to evaluate the effect of teaching methods over time if the same test items are used at the beginning and at the end of the experimental period to allow direct comparison. All may also be used diagnostically, i.e., to help a teacher analyze the level of a child's development at a given time, or in a given drawing or verbal description having then an indication of what the child needs to be next supported in developing. The tests are functionally relevant to progressive levels of development and are therefore guidance instruments for teaching as well as being usable for pre-post evaluations of teaching programs, experimental or otherwise. There is no separation in criteria for development in specific instances from criteria for development over time.

In addition to flexibility of the tests with respect to multi-purpose use for teaching and for evaluation, the tests are also flexible with respect to content. They are not bound to one subject (as, for example, the Harris-Goodenough Draw-a-Man Test is bound to the subject "man"); any meaningful subject for drawing or related verbal description can be used. Teachers can see "intelligence" in what the children do in their daily work; they need not depend alone on what standardized test scores say (these being scored by someone else for statistical relevance and not directly informative of what development in intelligence entails).

Four of the 10 tests are designed for use by regular preschool teachers, primarily to measure cognitive development in drawing and words. Six are designed for use by art teachers in more detailed analysis of preschool children's drawings, three focusing on cognitive development and three focusing on artistic development.

The four tests for use by preschool teachers enable them to (1) rate the level at which a child is drawing a recognizable figure, (2) count the number of concepts (recognizable features) a child enters in his drawing of a given subject, (3) count the number of concepts (descriptors of features) a child uses in his description of a given subject, and (4) count the number of concepts a child uses in both his drawing of, and verbal description of, a given subject. The evidence is that these tests can be used reliably and validly. Contrary to common assumptions among preschool teachers, they are quite able to make the judgments necessary to teach and test in a program of using drawings for cognitive development. Their scores produce correlations with criteria which are the equivalent of those produced by experienced art teachers assessing the same drawings with more detailed instruments.

The six tests for use by art teachers are three each for cognitive development and artistic development in drawing. The three tests of cognitive development enable the teacher (1) to rate a given drawing for cognitive content on an eight level scale, each level behaviorally specified; (2) to rate a given pair of drawings of the same subject for difference in cognitive content using a six level loss-to-gain scale for each of 10 specified cognitive dimensions of drawing; and (3) to rate a given set of a child's drawings done at one time with a correlative set of that child's drawings done another time for change in cognitive content "overall," using a simple six point scale.

The three tests of artistic development enable the art teachers (1) to rate a given drawing for artistic quality on an eight level scale, each level behaviorally specified; (2) to rate a given pair of drawings of the same subject for difference in artistic quality, using a six level loss-to-gain scale for each of eight specified artistic dimensions in drawing; and (3) to rate a given set of a child's drawings done at one time with a correlative set of that child's drawings done at another time for change in artistic quality "overall," using a simple six point scale.

These tests offer art teachers three major benefits: (1) a way to systematically distinguish between cognitive and artistic aspects of drawings; (2) a way to operationalize teaching for either cognitive or affective development; and (3) a way to collaborate with preschool teachers who want to use drawing to help disadvantaged children develop. The interrelatedness of the two testing programs, one for the regular preschool teachers and one for art teachers, invites the last development.

The battery of tests is described in Chapter IV for the six used in the diagnostic study, and in Chapter VII for the four added when assessing the teaching methods.

4) Contributions by conceptualization

Having in mind (1) the needs of disadvantaged preschool children for an education that develops their cognitive (and affective) abilities, (2) the prospective value of drawing as a means to the development of such abilities, and (3) the need for a program of applied research and experimentation that develops the capacities of teachers in working situations to offer an appropriate education, we undertook a clarification of concepts that seemed essential to make such a development possible.

In the course of that work we advanced theories with respect to (1) disadvantage, (2) cognitive-affective development, (3) drawing as a means to cognitive-affective development, and (4) applied research and experimentation as instrumental to staff development as precursor to child development.

In respect to "disadvantage," we took the emphasis off of difference in cultural origins of the children and put the emphasis on the common necessities of children in modernizing societies to learn how to learn, and to become progressively more able to teach themselves. In setting the experiment within two nations as separated geographically and culturally as Israel and America, we tested the concept and found it generally applicable. The data revealed that, on the whole, the patterns of response to the teaching methods and tests were similar in the two settings. We were glad to have data descriptive of the two settings, however, since we discovered a difference that suggests a different emphasis in America and Israel at a certain point: in visual differentiation and verbal differentiation, the Israeli children seemed to be developing integrally; the American children, on the other hand, seemed to be developing visually and verbally in two separate tracks. Teaching in Israel, therefore, need not make a special problem out of unifying visual and verbal development while teaching in America would need to make a special effort to gain the benefit of transfer across the visual-verbal media as means to later school success. While, therefore, the assumption of similarity in disadvantage in two modernizing nations is generally confirmed, it is demonstrably better to have data in description of each setting than to be left to the mercy of assumption, alone.

In respect to cognitive-affective development, we stated that the growth of a learner depends on his ability to make ever increasing differentiations with correlative increases in integrations, pointing out that a child can come to learn more and more provided he has opportunity to sequentially (1) become involved, (2) differentiate, (3) self-own, (4) express and act, (5) relate knowings to doings, (6) identify what he does not know, and (7) seek further knowings for growing. These activities are then recognized as containing within them both the cognitive aspects of differentiating and integrating the knowns, and the affective aspects of differentiating and integrating the acts that connect the actor transactionally with his environment in ways that can fulfill his human potentiality for development. Cognitive and affective aspects are thus seen as intertwined in child development. The results of the experiment confirm the connection; the theory holds and transcends the dichotomy of cognitive and affective that so often permeates and prevents sound educational development.

In respect to drawing as a means to cognitive-affective development, we point out how readily the act of drawing can lend itself to "increasing differentiations with increasing integrations," allowing the child the opportunity to carry through the sequence of acts cited above (i.e., becoming involved, differentiating, self-owning, etc.) as necessary to the growth of a learner. Using drawing in this fashion, the experiment bears out the theory as it shows children developing both cognitively and affectively in response to the teaching offered.

In respect to applied research and experimentation, we stated three principles: (1) that a separation ought not be made between the settings in which knowledge is produced and the settings in which knowledge is, indeed, to be applicable; (2) that the research-experimenters should seek to develop the participating staff and teachers in ways which are humanly consistent with the ways in which the staff and teachers are then to develop the children; and (3) that the principles which prescribe the conditions for cognitive-affective development in children are principles which also prescribe the conditions for cognitive-affective development in staff and teachers; namely to become involved, to differentiate, to self-own, to express and act, etc., as the sequence of acts essential for the growth of learners prescribes. In the project, the creators of knowledge were those who were then using the knowledge; the research-experimenters related to the staff and teachers in the same basic way that the staff and teachers were then to relate to the children; the staff and teachers were the actual conductors of the teaching experiment, and were thereby involved, differentiating, self-owning, etc. as the path to growth requires. The results from the children testify that when such principles are held in mind through the participating echelons, research and experimentation can benefit an applied situation. The gains of the children (at the end of the line of echelons) are evidence that child development is possible when the adults who successively attend their development are themselves involved, developmentally, and the same principles saturate the whole

domain. Data derived from the applied situations used in this experiment are predictively relevant to similar applied situations when the contextual frame of principles guiding and disciplining the latter are like those of the experiment for self-and-child development.

A discussion of the concepts concerned with disadvantage, cognitive-affective development, drawing as a teaching medium, and conditions for the productiveness of applied research is contained in Chapter II.

D. Realizations and Recommendations

Assuming an audience of those who are responsible for preschool education of disadvantaged children, we here undertake to distill some of the more important realizations to which our experience on this project has brought us:

(1) The basic concepts are crucial. Until cognitive development is understood as a necessary and feasible goal for preschool education of the disadvantaged, there is little prospect for success of any method designed to that end. Until cognitive and affective development are understood as intertwined in the development of children, there is little prospect for success in using drawing, or any other art form, for its value in child development. Until research and experimentation are understood as means to the fresh development of staff and teachers, there is little prospect for success of research and experimentation in developing children.

(2) Certainly the argument is strong that drawing should be used for child development throughout the preschool years. It is a form of reading and writing; it affords a child a way to communicate, and it supplies feedback evidence to the child as to the level of his own accomplishment; it is an ancient "natural" growth device.

(3) We were able to experiment for only a period of 10 weeks with three one-half hour sessions per week, comparing methods concurrently used rather than sequentially used. Were drawing to be used throughout the preschool years, the sequential relevance of the methods to child development would need be planned, experimented with, and better understood.

(4) The problem is not to decide which method is forever best, but to decide the order in which each may be utilized to match and fit what given children at a given time can then best use to maximize development.

(5) Varied methods may well benefit from varied lengths of time they are used, and from varied intensities with which they are applied. This is all open to experiment.

(6) Our data, limited within our contextual frame, indicate that two methods are fitted well to preschool disadvantaged children at the

beginning of their use of drawing for development. These are the methods of Observation and Technique, both of which emphasize visual form, the first as appearing in the environment and the second as appearing in the drawing, per se. Using one to emphasize its leading strength until the children show the benefit, the other may then be brought into play as major emphasis to cultivate, in rhythmic way, the growth of the child's capacity to transact fulfillingly with his environment.

(7) With the foregoing plan held until the children show a sound ability to deal with visual forms as found in their environment and as made by their own hands, the methods of Touch and Discussion, each amplified beyond what our experiment could provide, would offer benefit. Each of these two methods push beyond the visual to cross into other media, Touch into feeling and movement, and Discussion into verbalization. Concepts stimulated through the medium of feeling and movement and expressed through the medium of drawing are required to be transformed en route, inside the child; received in one medium and re-born in another, the concepts have rootage, emphasis, and vitality they cannot well attain within one medium, alone. Concepts stimulated by words and expressed through drawing, or stimulated by drawing and expressed through words, are double-bound and relevant, especially to the strengths the child will later need in school where words increasingly become the major medium. Neither Touch nor Discussion had full chance in the experiment to show its type of benefit because the children were all involved at the beginning of their use of drawing for development and could not yet respond in more complex ways across the media, having still a major need to handle the visual form of conceptualization on its own ground.

(8) The principle which appears to govern the effectiveness of a method in respect to stimulus and response is that children prosper best when what they receive as stimulus is balanced out by what they are then capable to give as their response. Receiving and giving are transactionally interfit. The stimulus can be increased in its range of complexity as response increases in its range of capability to handle complexity. A response fully formed in balance with its stimulus is invitation, then, to increase the range of the stimulus; thus growth occurs.

(9) There are other methods than those we designed; they may better fit, depending on the circumstance. The main point to keep in mind is that no one method or set of methods can be the answer, in themselves, but rather that experiment become a way of life in the course of which methods work and gains accrue as residue of fresh life-in-mind, running through.

(10) For any given method tried, it is important to clarify the plan until its effects can be made evident, and then to use the plan until its benefits show through. Children can learn what they are

taught only as they have the chance to clearly know in what, and how, they gain support; apart from that, they have no way to know what's being taught, and lacking that, they lose a way, as well, to know what learning is when they are doing it.