DOCUMENT RESUME

ED 024 454 PS 001 316

By- Fowler, William
Concept Learning in Early Childhood.
Chicago Univ., Ill. Laboratory Nursery School.
Pub Date Nov 65
Note- 21p.; Paper presented at annual meeting of the American Educational Research Association, Chicago, Illinois, February 12, 1965.
Journal Cit- Young Children; v21 n2 Nov 1965.
EDRS Price MF-$0.25 HC-$1.15
Descriptors- *Cognitive Development, Concept Formation, *Culturally Disadvantaged, *Educational Strategies, Games, Group Instruction, Learning Activities, Mediation Theory, *Preschool Programs, *Teaching Techniques

Because disadvantaged children have usually experienced sensory-cognitive deprivation or distortion, it is necessary to discover ways to offset this deficit. A program is being conducted to learn to what degree the introduction of systematic programing, while motivation techniques are retained, can reorient essentially noncognitive learning styles and sets in young children. Sequential and organized presentation of stimuli, emotionally supportive teaching attitudes, and flexible teaching styles are important if disadvantaged children are to progress in their cognitive development. Accomplishment of the basic forms of learning tasks requires children to master three processes: (1) discrimination-identification, (2) matching-constructing, and (3) sorting-grouping activities. Small groups (four to eight children) are taught by two types of teaching techniques: play-game activities and atmosphere or a problem-solving situation. The child moves from simple to more difficult levels of activity and from concrete to abstract reasoning. (MS)

CONCEPT LEARNING IN EARLY CHILDHOOD*

William Fowler

Principal

University of Chicago Laboratory Nursery School

Assistant Professor
of
Education and Human Development

Young Children, (formerly the Journal of Nursery Education)
Vol. XXI, No. 2, November, 1965.

*Paper presented at annual meeting of the American Educational Research Association, Chicago, Illinois, February 12, 1965.

Concept Learning in Early Childhood

Today we seem to be witness to an explosion of interest in cognitive processes and their origins in early development hardly foreseeable a few years ago. There is a growing awareness of the possible importance of the early years as a foundation if not critical period for the establishment of basic learning sets and cognitive styles. There is also a widening of interest in the longterm, emergent and developmental character of complex thought processes.

Much of the impetus for the scientific popularity of these new foci has paralleled, if it cannot be entirely attributed to, the national and even international political sociology of our era. The race from Sputnik and the bottomless demands for education of underdeveloped world populations have seemingly contributed to the discovery that our own country is also inhabited by large populations of intellectually underprivileged people. With this discovery we have come to believe that poverty may be related to cultural deprivation and that social deprivation may be partly founded on certain root perceptual and conceptual deprivations, traceable to the earliest years of childhood.

Under such crash circumstances, it is hardly surprising to find that much of the research on problems of early cognitive development, deprivation and stimulation are in the nature of crash, field projects aimed at developing viable educational settings for preschool, culturally disadvantaged children. More basic efforts to formulate and study the experiential-developmental course of concept formation in the beginning phases may be found in the writings and investigators like Deutsch and his colleagues (1964), Hunt (1961), Hess (1963), myself (e.g., 1962, in press) and others.

Notwithstanding this exponential growth of activity on these problems, much current research thinking on the emergence of cognitive processes remains encapsulated in either of two limiting frameworks. Both frameworks fail to concern themselves adequately with the etiology of concept development. Of these widely prevalent viewpoints, one tends merely to characterize and the other simply to measure intellectual processes at various ages, relating them, respectively, either to longterm, descriptive developmental theories or to short-term, general behavior theory models. In neither model is their much attempt to explain or control the course of development over time. On the one hand, the newer orientations following the molar, structural concepts of Piaget tend to be mired in ideal type, age-stage comparisons rather than tracing the specific, antecedent conditions and mechanisms which produce development. On the other hand, much of experimental child psychology, following the classical S-R model, while not uninfluenced by the structural concepts of Piaget, continues to ignore the developmental history and life's circumstances of the subjects which they study. There is, in short, still little experimental effort to undertake basic research on long-range educational problems of cognitive development.

In the course of attempting to grapple with some of these divergent orientations and explanatory gaps, I have evolved something of a model of developmental learning processes in the early years. The schema is aimed at pulling together a variety of poorly related concepts from the fields of learning and cognitive development for consideration in the little developed area of systematic education and longterm programing of concept learning in early childhood.

Preliminary descriptions of the model have been derived in the main from my work on early reading (Fowler, 1962, in press). More recently, I have been formulating the same type of conceptual organization in terms of broader subject areas of knowledge, formulations which I would like to present here today. As a means of general orientation, I shall furnish a brief overall picture of the schema. I shall then probe some of the central concepts in greater detail, illustrating their utility as we have been applying them at the Laboratory Nursery School and in projects with culturally disadvantaged preschoolers. At various points, I will also endeavor to relate them to some of the developmental issues and problems of (early) cognitive development.

Following the notion that development is a process of acquiring increasingly complex mental structures and modes of functioning through the cumulative interaction of the growing child with his environment, our approach is one of attempting (1) to program systematically concept learning and (2) to devise the most effective techniques and role for the teacher. To accomplish the first point, we can identify relatively focal structures in the social and physical world and set up learning programs which will enable a young child to learn specific features and relations of and between structures as well as lead him to the foundation of general concepts. To insure cumulative success for each child, we define functional units of analysis along continua of complexity.

Under the second main proposition, we establish a learning situation and style of relations to facilitate cue-guided stimulation. The general framework is founded on a discovery-problem-solving approach but is liberally immersed in dramatic and play-oriented activities. Much of the activity entails physical manipulation of miniature or pictured objects by children in small group settings.

Proceeding from this very brief summary to some elaboration, the concept of structure as used here applies both to the patterning of the external world and the organization of the child's mental processes in schemata, as Piaget calls them (1952). It is assumed that it is the lawful ordering of reality in patterned and operating systems which makes possible the emergence of adaptive structures in the child's mind and patterned, interrelated systems of action. Meaning, in other words, has no basis except in terms of the close and ordered relations of mental structures to reality structures.

At the beginning, in infancy, reality structures, as represented in the mind, are presumably grossly incomplete, immediate, and little generalized. Piaget makes much of this kind of distinction and the long developmental distance between what he defines as the early perception of infralogical structures and the only gradual and later emergence of classificatory mental structures (Flavell, 1963). By the former he means the direct perception of single objects and their components and the corresponding part-whole relations, spacio-temporal contiguity and physical continuity involved. Classificatory structures, on the other hand, are essentially constructions of the mind, although based on similarities and regularities among objects which are abstracted to form type structures. Physical proximity and continuity are not conditions for the formation of abstract or logical structures, according to Piaget.

In my organization of a schema for beginning conceptual learning, I consider it important to concentrate upon both single, object structures (and their internal organization) and abstract classificatory structures. Direct, perceptual-motor manipulations of simple structures may well predominate in the intellectual modes of the infant and preschool child. From an educational point of view, however, the problem appears to be one of facilitating the developmental transformation of the child's intellectual operations from the level of these infralogical structures to more complex and abstract forms of logical functioning. According to Piaget and some evidence, the latter, complex structures typically evolve during the four- to seven-year-age span (Flavell, 1963; White, 1965). But virtually all of the evidence for Piaget's theories and the so-called "norms" of mental development have been gathered with little regard to prior experience, let alone the child's total life history (Fowler, 1962). In other words, there has been scarcely any assessment at all of the critical and cumulative role that learning plays in the development of concepts.

The importance of planning and guiding stimulation from the beginning and throughout the ontogenetic span of development is inherent in the cumulative nature of discrimination-generalization processes. The terms discrimination and generalization themselves imply processes of choosing among dimensions of reality to form concepts about it. They also imply the possibility of alternate paths along which a child can develop. The first discriminations and generalizations acquired become foundation concepts upon which subsequent discriminations and generalizations must be erected. All ensuing concepts formed serve as cumulative constraints determining which higher order paths to abstraction and which set of representations of reality we come to comprehend--or even whether we attain any at all. A central assumption, then, upon which my early concept learning model is founded is that we should concern ourselves with guiding and systematically programing a child's cognitive development from the earliest periods of life.

The first step in setting up a stimulation program is the selection of a particular subject area of reality, for example, modes of transportation, community structure, zoology, reading, foreign languages, or almost any domain of reality which can be defined and presented in a form sufficiently simplified for a child to learn as Bruner has suggested (Bruner, 1960). Ease of obtainment or fabrication of materials and pictures are likely to be important determinants of choice. Closeness of relation to the preschool child's interest dominant in the culture is secondary under the assumption that teaching techniques utilized are adequate to arouse and sustain interest in unfamiliar material, although this may influence learning gradients established.

The act of selecting a specific area of reality for a learning program is *per se* a demonstration of one principle upon which the conceptual model is built, namely, the utility of an analytic, simplifying approach to studying the world. Having decided upon some area considered appropriate as a content area of value for children to learn, extension of this principle leads to an analysis of the structure into primary elements and infra-structural relationships as well as to charting a program according to levels of difficulty.

The approach is not one of merely studying elements as simplified and isolated bits, however. It is rather concentrating upon parts--both elements and simple relationships--to sharpen perceptual focus but also to study them as components subordinate to some supra-ordinate system or larger infralogical structure. The aims here are to simplify the intricacies of a structure through selecting out key dimensions while ignoring others. This, in turn, is assumed not only to facilitate learning about particular infralogical structures but to orient learning toward the development of abstracting processes.

A key principle represented here is the importance of steering between the extremes of molecular (S-R) versus molar (gestalt) styles of learning, an unproductive polarization of alternatives which has long plagued theories of learning and education. By presenting material in a shifting but interrelated focus of attention on simplified parts and wholes, through a process of analysis and synthesis, the child is enabled to acquire a better conceptual grasp of both the forest and trees. Alternating analytic-synthesizing approaches toward stimulation facilitates learning simply because reality is organized in ways that parts bear some relation to one another and to a total structure, through the use they serve in the construction and operation of a structure. It is, in fact, the apparent organization and working of reality domains according to structural-functional mechanisms and relations which forms an important basis for this conceptual model of the stimulation process.

In our current experimentation there are a variety of alternate schemes for establishing sequential levels of difficulty which we have been exploring. The organization of levels which we have found more or less useful are, roughly, first, the gross perception of objects and their functions; second, focus upon salient features of objects, their functions and relations to the whole; third, ecological relations of the given structure and its components to other structures and aspects of the environmental context generally; fourth, classificatory activities, which involve sorting and grouping of objects according to abstracted structures and functions of objects and in relation to the organization of larger supraordinate systems.

In general, while we may define certain kinds of organizational foci and related tasks in terms of "levels", much of this is a matter of convenience in outlining perspectives and guides for teachers. There is in actual practice considerable overlap among the levels in keeping with our analytic-synthetic approach as well as in order to capitalize upon a child's curiosity to explore the various internal features and functions of objects and their relations to the ecological fabric. In some ways we are dealing as much with directions of analysis as we are with levels of difficulty.

There are, nevertheless, at least two ways in which gradients are followed. Aside from the presumably greater demands for conceptualizing and abstracting processes which the classificatory tasks impose, within each of the major levels or directions of structural analyses, certain definite gradients of difficulty are established and more or less followed. Among the criteria for setting up these gradients are degree of familiarity or cultural commonness of objects; the complexity of a specific object structure, its parts and mechanisms; and the number of attributes, parts and objects and interrelations which are concentrated upon in a given event sequence or operation of a system or subsystem. There is the additional factor of ordering symbolic mediation in amount and kind of difficulty. This is more easily included in our subsequent description of the instructional techniques and situation.

Having outlined our approach to defining the dimensions of a schema, it may be useful to illustrate their applicability to a domain such as the structure of a community. By community here I mean roughly some local unit of socio-economic organization which embraces clusters of residential, manufacturing, agricultural and distributive units of activity and the network of relations among them.

With respect to our own contemporary scene, therefore, some of the obvious conceptual units with which to start a program are, e.g., a home, school, store, factory, farm, or community electrical circuits. Each of these concepts can be conveniently represented in concrete form--which draws in another major pillar of the model. Early stimulation programs are heavily built around the manipulation of real objects--usually in miniature or in pictures--in keeping with the low power abstracting abilities of early development.

Starting with pictures and toy models and of occasional excursions to stores, houses, factories, garages, parks and people, at the first level, we explore a child's familiarity with the major dimensions of a community structure. The type of cognitively oriented and developed child of middle-class, professional parents who attends the Laboratory Nursery School is already familiar with most of the objects and many of their component features. One is likely, therefore, to find oneself immediately launched somewhere on at least a second level series of discovering and discriminating such particulars as cash registers and greasing cars in a gas station or money and checking accounts in a bank. But wherever one begins, gradients of complexity are selected and pursued on the basis of ordering in the number and complexity the typical structural-functional components of each community distribution unit, e.g., of a garage--pumps for serving gasoline, rack for servicing a car, and so on. The mechanisms for operating a gasoline pump are presumably more complicated than the process of gasoline flowing into an automobile's gas tank.

From these examples it may be apparent that centering attention upon the internal structure of a community subordinate structure like a garage as opposed to its external relations with the community is a fairly arbitrary approach. It is here that the overlapping of units and relationships among structural levels becomes most evident. For instance, tools are standard components of a hardware store at one level of structural analysis; but tools also relate to and are synthesizable in terms of other categories, e.g., houses and home repair, and broader community concepts of community maintenance and membership comfort and shelter. Structures at one level constitute the units at another level of analysis. The principle here, in sum, is merely to simplify the study of structural systems by momentarily isolating components from the network of internal-external relations of systems and subsystems. Components are sorted out, concentrated on and synthesized in one set of relations and directions, a step or so at a time.

In this maze of guided learning, further complexity is attained along two main arteries. One of these, again, involves the kind and number of relations toward which the child's understanding of the total community organization, operations and multilateral pattern of relationships is led. Ultimately, it is possible to conceive of sketching in for a child a still highly simplified but relatively complete picture of a community which embraces such concepts as the basic functions of money, the division of labor, socio-economic class and the like. To realize this goal, however, we must also traverse the second major arterial sequence, namely, classificatory concepts, or our fourth level of structural analysis.

From one point of view, classificatory or generalizing activities, as with the three other directions of analysis, are not something entirely deferrable to a more advanced stage of the stimulation program. The moment we lead a child to distinguish a hardware store from a store in general, as a generic, we are introducing generality, or membership in a category. We thus overlook the fact that a hardware store sells tools and a grocery store, food, identifying only attributes they have in common, especially that of selling goods. When we do this, of course, we are introducing abstracting processes. Thus the supposedly simple labeling of individual stores--hardware, grocery, shoestore--in a community is in fact ranging across examples of a type concept. These roots of the language abstracting process through words begin very early according to Vygotsky (1962).

Notwithstanding, abstracting activities are treated in this structural model as a separate more complex type of activity. In a sense, word labeling and object discrimination activities probably do involve abstracting and generalizing. Yet, it is presumably a much simpler process to discriminate a single object from among a cluster of objects, to which a word label is associated, on the basis of gross configurations, than it is to sort objects--even those immediately perceivable--into groups on the basis of selected attributes which some but not all objects have in common. It is also evident that second and higher levels of hierarchical classification (e.g., a given individual works at a waitress type of job, which, in turn, is a class of semi-skilled work within a still larger framework of working-class occupations) are even further removed from simple object discrimination, labeling type tasks. How far a child can progress through these levels remains to be determined since Welch (1940) and this speaker (1961) found almost no second level hierarchy concepts available to three- to four-year-olds even following relatively longterm programs of stimulation continuing over several months or more. It is hoped that present attempts to analyze and program along the specific structural lines of the current model, however, may prove more successful than earlier crude attempts.

The techniques employed for cognitive stimulation in the early years of child development may be described in terms of a situational setting and a few principles of interest arousal based on positive attitudes and styles in teaching relations, competence motivation (White, 1959) and incidental learning. It is productive to organize a stimulation program within the framework of a project unit of work for which the sequential guides and materials we have illustrated are prepared. The project is presented to a definite group of children over a period of several months on some regular basis, preferably no more than a few minutes or so per day. Brevity, frequency and flexibility are important considerations in dealing with the brief attention and short recall spans and quasi-stable learning styles characteristic of the younger developmental periods. Small groups of four to eight children in a small area, visually and auditorilly separated from the valence of competing activities and attractions, is useful. The interest of groups of this size in insulated settings can be more easily corralled and group games managed. At the same time, the size permits individual tailoring and a loose framework of guidance for promoting productive self and paired direction of small projects.

The teaching approach itself rests on two types of techniques, one of these a play-game activities and atmosphere, the other a problem-solving orientation. The individual stimulus units, the pictures and small objects (when available) are presented to the children, singly and in small clusters (as more are learned) spread out on a flat surface (table or floor) around which the children are seated. The basic forms of the learning tasks consist of three kinds of processes: discrimination-identification, matching-constructing and sorting-grouping activities. Pictures or objects are discriminated from others in a set and/or identified (verbally labeled) at the teacher's request. Pictures are matched with other identical or similar pictures or put together with a pattern of other pictures to construct (synthesize) a larger structural scene. And pictures are sorted and arranged in groups according to criteria defined by the teacher for the abstract classificatory processes. All three types of activities are viewed as still rooted in the basic dimensions of discrimination--identification processes. The more complicated forms are merely extensions and elaborations to encompass multilateral relations, interrelations of parts to wholes and discrimination of classes of objects and <u>classes</u> of ecological settings upon the basis of selected cues identifying type functions and structures.

There is a model question to be employed by a teacher which guides a child's attention effectively in the discrimination-generalization activities, while setting up for him a search task and an active role involving physical manipulation of concrete "things". The basic question or instruction follows some varient of the basic form, "Where is the bank?" or "Find all the pictures which show people working in factories." It may be seen that this question is readily adaptable to involving a child in specific tasks whose success is contingent upon performing higher level cognitive operations of a classificatory type. Thus, "Put the pictures of professional workers in this pile and the pictures of skilled workers in this pile."

Play orientations consist of "seek and find" and various targeting types of games, and other similar, competence challenging, means-end problem-solving tasks. In this category are included the finding of correct choice pictures hidden under one of a series of boxes or large cards; dropping a picture in a box after discriminating it correctly from among a cluster on a table; or pinning a discriminated picture at a correct position in an ecological mural painted on a broad expanse of paper on the wall. Open-ended ecological settings may be constructed from materials and pictures provided or cut up pictures may be assembled in picture-puzzle in synthesizing and matching tasks.

A second category of incentive technique used consists of a teacher narrating tales around the objects and scenes while she manipulates the stimuli in dramatic role play. The child is invited to participate along with the teacher in the course of the story development, which exposes him--incidentally--to further reinforcement experiences.

In every stimulation task, correction of "wrong" responses is avoided and liberal use of praise addressed to the child's effort is recommended. In this dramatic framework original and imaginative constructions can thus be encouraged. Yet learning can also easily be chanelized in definite directions of sequence and organization. The teacher simply has to re-demonstrate a model associational task or to re-ask for a desired discrimination from time to time. Through varying widely the forms of the play activity in which the basic discrimination-sorting tasks are immersed, a large number of repetitions can easily be provided without the usual avoidance learning consequences of drill. Reinforcement is also multiplied in the small group setting through each child observing responses of the other children.

While all play-instructional sessions are organized around discrimination-generalizing task activities, there is a further gradient of difficulty built into the program; namely, the degree of symbolic mediation deriving from the arrangement of the tasks themselves. Initially, all new objects and relationships are labeled and defined for the child, as each is introduced. Immediately following this demonstration by the teacher, the next task or step in order of difficulty requires the child to discriminate the same item in response to an instruction which also provides a verbal label. His task at this beginning level is thus to associate this auditorily furnished label with the visual stimulus pattern placed immediately in front of him. Even at this stage memory and hence mediation are involved in this perceptual-associative act. There is necessarily some time-lapse, however brief, between the model associative act performed by the teacher and the cognitive linkage between word and act performed by the child.

In subsequent stages, the gradient for the amount of symbolic mediation may be steepened through extending in time and space the distance between a teacher's demonstration model and a child's performance. Thus, at later stages of the program, a child might be asked (in review) to perform associational tasks which neither a teacher nor himself (self-reinforcement) had performed for some weeks.

Mediation also increases in proportion as the distance between the visual stimuli and the emission of a verbal concept is increased. Displacing a picture from a table at which a child is sitting to a blackboard may be one step. Bringing a picture from home, where the search cannot even be initiated until some hours after the verbalization is stated by a teacher at school requires considerably longer memory storage. Similarly, in other ways, more complex mediation is demanded by removal of ecological context cues or by inserting objects in varied ecological scenes. In the same manner we may show other pictures of similar type objects whose structure or function may be similar but whose components, organization of structure, or mechanisms may vary. One may also increase the number, variety and spread of parts and relations which must be scanned and conceptualized, and so on. Again, each of these kinds of variations are introduced carefully, step-by-step, graded in terms of their degree of similarity, closeness and complexity in comparison with the original stimulus patterns and task requirements. We may also simply ask a child to identify a presented stimulus or set of relations, the teacher furnishing no verbal cues, the child having to rely entirely on his own internal mediation in response to the query, "What is ____?" This last form of task tends to test rather than teach a child and is generally minimized except in measurement sessions.

The important factor is to insure success at each step of the program, that is to link each step in size and distance to the prior sequence of steps, always presenting bites of a size a child can chew. This is considered critical in order to minimize failure experiences, foster achievement motivation and a sense of intellectual mastery and autonomy, as well as to produce progress in complexity of cognitive functioning and the extent of specific and general concepts absorbed.

Any of these sequences along a continuum--or in stages--of complexity need not be rigidly adhered to in the actual learning situation. Indeed overconcern with simplicity is likely to stultify teaching style and inhibit curiosity and exploration of structure, thus defeating a major educational goal. In addition to the active, physically manipulative search role which is continually set up for the child, an inquiry orientation is embedded into the nature of the guiding, stimulating process. Any given series of analytic construction and classification tasks requested of a child include alternate and sometimes overlapping means and classificatory structures for conceptualizing. These shifts of foci are intended to convey to the child the idea of alternate pathways of inquiry about the world, while preserving the utility of guidance along and among particular paths and systems.

Within this kind of flexible framework, some rough approximation to a course graded according to levels of complexity is considered essential in setting instructional priorities if rates and degree of mastery are to be maximized. A balance between encouraging wider inquiry and insuring continuing progress through grading material to each child's level and style is attempted. The implications for producing a thoughtful citizenry inherent in developing attitudes of inquiry are clear. On the other hand, the value of programing lies in the fact that unless stimuli are ordered sequentially, it is difficult to regulate the flow of stimulation to conform to each child's rate, style and level of acquisition. In the absence of the opportunity to pace and tune the presentation of stimulus patterns in close approximation to each child's evolving levels of comprehension, we offer less than ideal conditions to promote the operation of mechanisms for advancing cognitive development and mastery.

In closing, deficiencies in the grading and tuning process loom with the largest prominence in educational settings for culturally disadvantaged children, or any children who have experienced massive doses of sensory-cognitive deprivation or distortion. The difficulty of tuning into the non-productive and sometimes rigidly concrete psycho-cognitive styles of these types of children, even at the three-year level, has recently been most graphically displayed to this investigator (Fowler, 1961, in press). Efforts to stimulate cognitive development in two such Negro children among a small group of identical twins and triplets over an eight-months' span in an experimental nursery school failed almost completely. There were no significant changes in cognitive functioning despite stress placed upon personal warmth, small group learning situations and the use of play-activity techniques. While all of the latter techniques may conceivably have been improved, the known lack of systematic programing has influenced my present efforts to proceed in this direction in projects on compensatory education.

Emphasis upon careful sequencing is not to minimize the importance of emotionally supportive teaching attitudes and flexible teacher styles or the value of dramatic play activities and games. The curious fact, however, is that while these children often manifestly enjoyed the relations and the activity situations, they nevertheless made no real headway in learning. One question to which I am presently addressing myself is to what degree can the introduction of systematic programing, while retaining the motivating techniques, reorient these essentially non-cognitive learning styles and sets already apparently so ingrained by the age of three?

REFERENCES

1. Bruner, J. S. The process of education. Cambridge: Harvard University Press, 1960.

2. Deutsch, M. Facilitating development in the pre-school child: social and psychological perspectives. Merrill-Palmer Quarterly, 1964, 10, 3, 249-263.

3. Flavell, J. H. The developmental psychology of Jean Piaget. Princeton, New Jersey: D. Van Nostrand Company, Inc., 1963.

4. Fowler, W. A study of process and learning in three-year-old twins and triplets learning to read. Genet. Psychol. Monogr. (In press).

5. Fowler, W. Cognitive learning in infancy and early childhood. Psychol. Bull., 1962 A, 59, 2, 116-152.

6. Fowler, W. Cognitive stimulation, IQ changes, and cognitive learning in three-year-old identical twins and triplets. Amer. Psychol., 1961, 16, 373 (Abstract).

7. Hess, R. D. and Shipman, Virginia. Cognitive environments of urban pre-school children. 1963, Urban Child Center, University of Chicago, Progress Report.

8. Hunt, J. McV. Intelligence and experience. New York: Ronald Press, 1961.

9. Piaget, J. The origins of intelligence in children. New York: International Univer. Press, 1952.

10. Vygotsky, L. S. Thought and language. M.I.T. and Wiley, 1962.

11. Welch, L. A preliminary investigation of some aspects of the hierarchical development of concepts. Journal of Genet. Psychol., 1940, 22, 359-378.

12. White, R. W. Motivation reconsidered: the concept of competence. Psychol Rev., 1959, 66, 297-333.