AN EXPLORATION OF THE ROLE OF OPPOSITION IN COGNITIVE PROCESSES

OF KINDERGARTEN CHILDREN

by

JOAN MARION COLLINS

B.Fd., University of Alberta, 1966

A THESIS SUBMITTED IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS   (EDUCATION)

in the Department

of

Professional Foundations

L. C

APPROVAL


Name:  Joan Collins

Degree:  Master of Arts   (Education)

Title of Thesis:   An Exploration of the Role of Opposition in Cognitive
                   Processes of Kindergarten Children


Examining Committee:




                        Dr. M. S. O'Connell
                        Senior Supervisor




                        Dr. J. F. Ellis
                        Examining Committee




                        Dr. A. R. MacKinnon
                        Examining Committee




                        Mr. F. J. Brown
                        External Examiner
                        Professor
                        Behavioral Science Foundations
                        Simon Fraser University
                        Burnaby, B. C.




                            Date Approved: _October 14, 1969_



ii

# ACKNOWLEDGEMENTS

I would like to extend my sincere appreciation to the many persons who have aided this research. I am especially grateful to Dr. M. S. O'Connell who supervised this investigation and also to the other members of my committee; Dr. A. R. MacKinnon and Professor F. J. Brown whose inspiration, criticism, and teachings helped to make this investigation possible and rewarding. To my husband, Terry, who has aided my studies in countless ways, my appreciation holds no bounds.

J. Collins

ABSTRACT

This thesis was an exploratory study of opposition functioning in cognitive processes. It was postulated that opposition can provide an ordering focus for children entering into learning tasks, if carefully selected controls are contained within the instructional materials used to present these tasks. Opposition, in this study, was defined as playing a catalytic role in cognitive processes and in so doing acting as the "mainspring" for comparison.

Twenty "five-year-olds" were observed as they worked with the experimental materials over a period of three to four weeks. The Language-Master Machine was used to present cards containing Richards-Gibson Reading materials to these children. The children were permitted to order their own presentation of these cards into the machine on four occasions. They were then asked to complete a series of tasks designed to assess the kinds of comparisons they had made:- in effect, how opposition (within the instructional design) had served to facilitate their comprehending.

Two kinds of analyses were made and then related to the two areas of concern selected for the scope of this research. These areas are: that of child growth and development and that of instructional design.

The Goodenough-Harris Drawing Test and The Draw-a-Classroom Test were used at the outset and at the completion of the research. These tests were used to obtain global measure of "process" or "changes in process" that had occurred (and had been transferred to other tasks) through exposure to the experimental materials. This first analysis resulted in one major finding consisting of a move from a "general" cat-

egory to a more "specific" category. On the Draw-a-Classroom Test the structural forms of language the children used on the second testing more closely approximated those structural forms found in the ten presentation cards, even though the total number of utterances the children made remained unchanged. These children showed evidence to suggest that they had comprehended the elements of opposition related to the positioning and comparing of the structural forms of language used in the experimental materials. Hence they were able to transfer this "knowledge" to other tasks. The Goodenough-Harris Drawing Test gave further support to this finding. Children whose Goodenough-Harris Standard Scores showed significant increases included items in their drawings that could be directly related to elements within the exper- imental materials. It was postulated that opposition served here to facilitate comparing between the drawing of a man on the presentation cards and the child's own drawing of a man. These comparisons were reflected in the child's subsequent drawings.

Picture and verbal completion tasks were given to the children in order to make a second and more specific analysis of how controls of opposition presented in specially designed materials were perceived by young children. Here, further delineation of the ways in which the children moved from a general categorization to a more specific and careful identification became possible. This "move" appears first at a "non-verbal" level and is exhibited by an attempt to perceive patterns <u>in</u> and the global structure <u>of</u> the task the child attends to. There was evidence to suggest that the children focused on comparisons of the ways in which their own speech was ordered with the speech order recorded on the ten presentation cards. Many instances of errors also

indicated that the children had perceived something of the structural

forms of the utterances within the ten presentation cards and had

patterned their verbal responses in a similar fashion.

Several implications for instructional design emerged:  Control of

language patterns in beginning reading materials seems necessary.

Evidence suggests that the Language Master Method of presenting

reading materials to children has merit, and that simultaneous presen-

tation of visual and aural stimuli in instructional design is both

vital and necessary is indicated by this study.  This investigation

offers support for the use of principles of opposition in instructional

design as an important variable in the meaningful control of "information

overload".  Procedures adopted in this investigation indicate that

experimental procedures used do influence the subsequent behavior and

perhaps the outlook of those exposed to them.  Therefore, the ways in

which performance or achievement is measured on these tasks is critical.

This study of opposition gives some insights into how effective

instructional design can facilitate comprehending.  Opposition in this

context becomes one of the means used by a learner making discrimina-

tions; it can, in turn, be used in other situations to invite, maintain

and validate comparisons.

TABLE OF CONTENTS

# LIST OF TABLES

LIST OF FIGURES

# AN EXPLORATION OF THE ROLE OF OPPOSITION IN COGNITIVE PROCESS

## CHAPTER I:   INTRODUCTION

"I walk through the long schoolroom questioning;
A kind old nun in a white hood replies;
The children learn to cipher and to sing,
To study reading-books and histories,
To cut and sew, be neat in everything,
In the best modern way - the children's eyes
In momentary wonder stare upon
A sixty-year-old smiling public man".
          (Among School Children; W. B. Yeats)

The thesis to follow is exploratory in nature.  Specifically, it is an attempt to make an intensive examination under controlled conditions of the role that opposition plays in the cognitive processes of young children.  It is postulated that opposition can provide an ordering focus for young children as they engage in the comparings involved in comprehending instructional designs.  The study explores the role of opposition as it relates to two specific areas of concern:  that of child growth and development, and that of instructional design.

Within the scope of this research the term "opposition" may be defined in the following way.  "Opposition" acts to serve a catalytic role in cognitive processes.  Opposition also acts as the mainspring for comparison and in doing so provides a working tool for the making of comparisons.  It is proposed here that opposition plays a significant role in the ordering and acquiring of cognitive structures.  This thesis therefore is an attempt not only at further "mapping" of this role but also at developing hypotheses for further research about the nature of this role.

## Opposition:   Child Growth and Development

In cognitive psychology, recent research has swung from a product-measurement approach to a more process-oriented approach.  The act of

"knowing" in the latter view consists of not only an examination or measurement of ends, but also of an examination of "means" in terms of "ends in view". "Knowing" in this sense involves activation of what is usually called "intelligence". Throughout the thesis to follow "intelligence" will be cast in the form of "intelligent behavior". "Intelligent behavior", in turn, may be broadly defined as that behavior in which "means" are selected and explored according to probable ends. Intelligent behavior, itself, provides the means through which knowing or ordering on the part of an individual evolves and further learning occurs. It is the activity by means of which process or "means" selected in terms of ends in view is facilitated, and, in this sense, is seen as a general term making specific reference to the higher forms of ordering and organizing occuring in cognitive processes.

Jean Piaget has greatly contributed to our understanding of how the child comes to order phenomena and act in terms of using his growing understanding of the inter-dependence of means and ends. Piaget views intelligence as the "form of equilibrium toward which all structures arising out of perception, habit, and sensorimotor schema tend". It does not, in his view, consist of "an isolated and sharply differentiated class of cognitive processes". (Piaget, 1960, p.6)

"Means" and "ends" in Piaget's system become realized through the gradual process of "adaptation", which is in turn composed of the complementary processes of "assimilation" and "accommodation". Assimilation is "the incorporation of objects into patterns of behavior, these patterns being none other than the whole gamut of actions capable of active repetition". Conversely accommodation takes place when the "environment acts on the organism" resulting in modification of the

assimilatory cycle. (Piaget, 1960, p.8)

Opposition acts to facilitate the processes of assimilation and accommodation through the mechanism of comparison. It is postulated that comparison, in turn, may act as initiator in providing an ordering focus for behavior such that assimilation and accommodation become possibilities for dealing with environmental stimuli.

## Opposition: Instructional Design

Little is known about how young children do, in fact, make comparisons. Little more is known regarding the account, taken by innovators of instructional design, of either the kinds of comparisons children are able to make or of the roles suggested for those implementing an innovative design. The number of children with "learning disabilities" provides a constant reminder of the fact that how children do interpret or comprehend instructional designs (that is, printed symbols in contexts) is still poorly understood. In studying how children learn to read, MacKinnon (1959) emphasizes the above assertion, and also draws attention to the fact that no one seems to have studied the "nexus of task and learner". Faris (1968) studied this nexus through observation of the active comprehending of an instructional design by individuals in a group setting. The study undertaken here postulates that opposition enters into the nexus of task and learner and facilitates comprehension. Opposition, in this perspective, is a strategy employed by learners as they attempt to solve problems.

Further, MacKinnon's study (1959) emphasizes language pattern controls as important variables of instructional design to contend with in beginning reading programs. Opposition acts to provide guidelines for the selection of these controls both by the learner, and by the designers

of instructional materials presented to learners. Further understanding of how opposition serves as a vital mechanism in this selection is one of the aims of the research undertaken herein.

Opposition has been briefly introduced and related to two main areas selected for the scope of this study. With this view in mind, the writer has attempted to study the kinds of comparisons a highly specific instructional design invites in young children; how children record these comparings; and any evidence of how children relate these comparings to their own "experiential worlds".

In the subsequent chapters the research is organized in the following way. Chapter Two covers a review of the literature pertinent to the notion of opposition and attempts to place this concept in a theoretical perspective. The design and procedural techniques of the research undertaken are discussed in Chapter Three and the results of the writer's investigations are reported in Chapter Four. Chapter Five provides a discussion of the results with a view to further research and theory development related to notions about instructional design in education.

CHAPTER II

REVIEW OF THE LITERATURE

"Comparison is at the same time contrast, expressed in the rejection and the elimination of those elements and qualities of the situation which other situations indicate are irrelevant".

(John Dewey)

I.   Theoretical Perspectives of Opposition

Discussion of Opposition has appeared throughout the history of philosophical inquiry.  As early as the sixth century B. C. the Pythagoreans went so far as to postulate that there existed ten fundamental oppositions in the universe.  These were:

> Limited and Unlimited
>
> Odd and Even
>
> Unity and Multiplicity
>
> Right and Left
>
> Masculine and Feminine
>
> Quiescence and Motion
>
> Straight and Curved
>
> Light and Dark
>
> Good and Bad
>
> Square and Rectangle

Similarly, Plato's entire Theory of Ideas is based upon the notion of perception of a union of opposites (the changeable and the perfect) in the constitution of the world of "Appearance" and that of the world of the "Eternal".

Much of Aristotle's writing may be viewed as centered around the concept of opposition.  Aristotle's view was that principles such as "unity" and "multiplicity"; "being" and "non-being"; "odd" and "even";

"hot" and "cold"; "finite" and "infinite"; are in fact examples of con-
traries all of which can be reduced to "Unity" versus "Multiplicity". That
all things proceeded from contraries was the notion from which Aristotle's
theories emerged. For example: Viewing moral virtues in terms of a
theory of contraries, Aristotle concluded that "virtue" always takes the
form of the mean between two opposing extremes.

Both Aristotle and the Pythagoreans viewed the opposition of "unity"
and "multiplicity" as the most fundamental of all opposites. Aristotle
expanded on the Pythagoreans' list of ten oppositions. In accomplishing
this, he was able to relate the notion of opposition to questions pertain-
ing to "matter" and "form". He did this in the following way. Substance,
for Aristotle, held the special property of having the ability to receive
opposites and he hence assumed that the opposed terms of matter and form
could only be found in a state of union, or in other words, in substance.
Substance, in turn, Aristotle viewed as being a two-sided totality; on
one side, all things grouped together formed "Prime Matter"; while on
the other side, all things grouped together were designated as "Prime
Form". Substance not only acted to receive opposites, but also made
possible the perception of what Aristotle viewed as the most important of
all opposites: those of "potentiality" and "actuality".

The discussion of opposition is evident throughout the philosophical
and theological dissertations of the medieval period. Good and Evil,
Heaven and Hell, God and the Devil, provide examples. Such oppositions
as these came to be viewed as absolutes where the absence of one side
automatically assumed presence of the other side.

Opposition during this time and throughout the course of history,
appeared and re-appeared with each new philosophical view of the dichotomy

of "universal" and "particular". With Thomas Aquinas, Opposition was elevated almost to a position of absolute dogma through the doctrine of "Material Forms" and "Subsistent Forms". No one questioned whether or not the data about which scholars such as Aquinas argued were valid or real, or remained static for all time. Instead, emphasis was placed on the use of reason and logic to provide a means for defending "truths". The only acceptable forms of "proof" were those cast in the forms of geometric proofs. Empirical means of verification or "Scientific" proof (as in contemporary writing) was not considered an acceptable means for the determination of "truths". These early historical views of opposition were reflected in problems which became the focus of later philosophical inquiries. For example: Descartes' discussion of mind-body dualism was so influential that its dominance within both theoretical and practical perspectives is still felt today.

Kant's attitude to opposites forms a key to the understanding of his writings. "Unity and Multiplicity"; "Inner-outer"; "Activity-Inactivity" are fundamental perspectives within Kant's system. Kant makes a distinction between "real" and "logical" opposition. In "logical" opposition the two components are mutually exclusive and hence cannot be simultaneously valid; in "real" opposition various kinds of matter are viewed as to their positive and negative activities. Kant looked to mathematics to form the notation for his oppositional system and its corresponding terms. Opposed terms were distinguished by plus and minus signs and if they were found to be equal, their arithmetical result became zero. Hence, for example, becoming is viewed as the result of combining such opposites as "arising" with "perishing" (that is, negative arising symbolized with a minus sign). This results in all

existential phenomena within the universe yielding a result equivalent to zero.

Hegel's writings, too, showed a concern with opposition which at times constituted the very core of his philosophical system. Dialectic, considered by Hegel to be the mode of "knowing" or "coming to know" was viewed as a system of three triadic components; those of thesis, antithesis, synthesis. The resolution of opposites (thesis, antithesis) was viewed as an immutable unity or synthesis which in turn led to the elevation of the knower who had perceived or achieved this synthesis to some "higher" form of knowing. Opposition, in this sense, was treated as the "Prime Form" of all experience and therefore was seen as existing independently from all other forms, interacting with them in the way of patterning mentioned above.

With the exception of perhaps Hegel, the early views of opposition briefly stated above may be classified as "self-action" perspectives. (Dewey and Bentley, 1949, p. 108 f.f.) At this stage of inquiry things or "reals" are viewed as acting under their own powers (mystically invested in them from some immutable force such as God). Opposition in these views is seen as having a power or existence independent of anything else. "Self-action" is the stage of inquiry "which establishes a knower in person, residing in, at or near the organism to do the knowing". (Dewey & Bentley, 1949, p.134) Both knower and known in the "self-action" stage of inquiry are made to appear as "reals", but are assumed to be of different realms. The knower, too, is assumed to have some superior power to apprehend the reality of the known from which he is existentially cut off.

The thinking of Newton, along with other writers, prompted a change

from the "self-action" view of the universe to what is called, by
Dewey (1949 p.135), the "inter-actionist" perspective. From this point
of view, things are seen as balanced against other things in causal
interconnection. Thus, "for every action there is an equal and opposite
reaction". "Inter-actionist" kinds of inquiry assume that elements can
be isolated and somehow detached from an experiential continuum to play
the part of "real" things which, when they "inter-act", become"causes"
or "effects". The position taken, in this view, is that there are
"reals" that exist apart from their interaction. Opposites, then, exist
as things which somehow impinge upon the organism whereupon the process
of interaction takes place. Further, it could be postulated that with
the publication of Darwin's theory of evolution, changes in how the role
of opposition was viewed became possible. Behavior, through evolutionary
controversy, came to be viewed, in part, as a result of the struggle
to maintain existence in the biological sense. This struggle confronted
theorists with the suggestion that such a doctrine was the key to change
and a condition for progress. Hence a re-examination of opposites and
the role of opposition, drastically different from the methodologies of
Aristotle and other earlier writers, was essential.

Reflecting this change, many psychological and learning theories
evolved, seemingly centered around behavioral oppositions. (For example:
Freud's pain - pleasure principle; or the drive theories of Hull, Mower
or Tolman.) Opposition, in a behavioral perspective came to be viewed
as a result of the possibility of a reciprocal neutralization of like
actions. Oppositions were still viewed as apparently static but based
upon tendencies or possibilities of interaction.

Thus it is not difference which creates conditions for behavioral

oppositions to occur but rather it is the juxtaposition of the two possibilities of "being", both having some commonality of function, that provides these conditions. For C. K. Ogden, opposition acts as a conservative factor in behavior, but it is never creative. It is not defined as the degree of difference but rather as a special kind of repetition ..."namely of two similar things that are mutually destructive in virtue of their very similarity". (Ogden, 1932, p.32) Ogden views opposition as arising from what he terms "spatial experience". In other words, symbolic forms relating various kinds of oppositions are identified with reference to the human body. Objects appear as opposites only insofar as some sensational factor is involved and perceived by the "knower". Opposition acts to render perceived phenomena meaningful to the knower. This action takes place in a "metaphorical" sense or in Ogden's words (Ogden, 1932, p.93) ... "That real entities (moveable objects) have true opposites is a linguistic illusion".

Ogden classifies oppositions in three ways. These include:

Opposition by Cut; Opposition by Scale; Opposition by Definition. These oppositions are qualitative in the sense that they arise from reference to telling or distinguishing "qualities about" rather than "measurements of" phenomena. (A distinction of terms is felt necessary here. "Quantitative" traditionally means those measurements referring to "direction" or "orientation" while "Qualitative" traditionally refers to things relegated to feelings, touch or sensations not empirically verifiable.)

Oppositions by Cut deal with the direct reference of the body in ordering knowledge about spatial and qualitative phenomena, such as left-right; or up-down; or come-go; or "A"-"Not A". Oppositions by Cut refer to situations where one instance or situation provides the mirror image for

the opposing instance or situation. Oppositions by Scale refer to the two opposite ends of a single continuum. They are, in a sense, extensions of Oppositions by Cut. In Oppositions by Scale, mirror images are not possible since gradations on a scale can only be measured in terms of their variance to one another. Black and white; top and bottom; future and past provide examples of Oppositions by Scale. Meaning occurs in these oppositions through the placement of them within a context employing the use of a continuum or scale. They are not merely positional opposites.

Lastly, Ogden talks about Opposition by Definition. These oppositions do not have any direct existential referent. Rather, the opposition is one that arises as a result of a linguistic-cultural referent which must be defined or be specifiable by the "knower" in order to be perceived. Ogden asks "What is the opposite of a circle?" (Ogden, 1932, p.73) - a question that he argues can be answered only through seeking or understanding the definition of a circle in terms of how it differs from other geometric figures. However, not all specifications necessarily have opposites. Oppositions, which are a result of the making of specifications can occur only among homogeneous continua. That is, kinds must be the same for opposition to occur.

Ogden's three classifications of opposition appear to be chiefly concerned with qualitative oppositions. Measurement or possibilities for quantification appear possible when one examines oppositions of Scale and Definition. Here, quantification can occur with reference to the "meants" of written or spoken symbols only within homogeneous continua.

It is postulated that in learning to read the child comes to assimi-

late both qualitative and quantitative oppositions. He proceeds further
to use this assimilated knowledge to accommodate to new and more com-
plex phenomena that he encounters as well as to make finer discrimina-
tions of "simple" phenomena.

I. A. Richards lends further support to Ogden's view of the role of
opposition in language when he states that opposition is an essential
principle governing meaning. "Perception of oppositions is the active
principle of language - and of all sign - situations". (Ogden, 1932, p.13)

Richards asserts that as a child begins to read, "spokens" form the
channel leading to what he terms the "meants". The "spokens" at this
initial stage are the familiar; they provide the "data" through which
comparisons of "written" with "written" and "meant" with "meant" are
made.

Richards illustrates this concept as follows: (Ogden & Richards, 1941)



Figure 1.
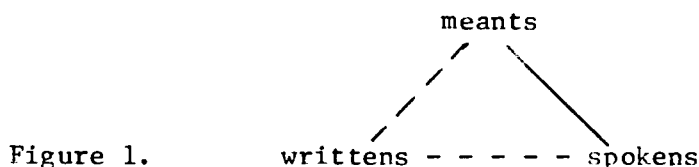
In this perspective speech and writing provide the modes of dealing with
"things meant", or "meanings". (J. Dewey would say that the "writtens"
and "spokens" also delineate or serve to pick out the "meants". This
occurs by means of the names, naming, named continuum.) Richards also
emphasizes that in beginning reading the "meants" must be fully examin-
able by the beginner. That is, they must provide possibilities enabling
the reader to represent and illustrate them in a variety of picturable
and plastic ways. They must also initiate opportunities for combining
in many situations with other "meants" equally examinable. "Spokens",

too, should be arranged in such ways as to invite comparisons and discriminations. Meaning in this sense is seen itself as a process of evolution; an evolution governed at least in part by the principles of opposition. Meaning, in turn, arises as a result of comprehending. "A comprehending is an instance of a nexus established through past occurrences of partially similar utterances in partially similar situations - utterances and situations partially co-varying". (Richards, 1955 p.23). The term comparison, or comparison fields serves to designate the act of coming together or setting apart of specific situations operative in the formation of the nexus.

Faris (1968) studied the dimensions of the nexus condition for comprehending. He found significant differences between the comprehending of instructional design by individuals working alone and individuals working in a group setting. He did not however, explore the role opposition plays in catalyzing the acts of various dimensions involved in comprehending, or as Faris termed it "the nexus" condition for comprehending.

Richards asserts that opposition, acting as the mainspring for comparison, enables the learner to see for himself differences in language patterning. Comparison in turn acts to facilitate comprehending in this context. The learner is invited to engage actively in putting the principle of opposition to "work". This is accomplished by letting the learner engage in comparing various situations expressed in language. Through this process the learner is able to "comprehend" how changes in words, sentence patterns, and structures reflect changes in meanings related to situations.

Opposition serves to act as design for learning in that it permits

flexible fitting of means to ends. The act of naming forms one out-
come of this design since it permits a tentative end to inquiry by an
act of designation or a demarcation of that which is named according
to certain specifications which are met. Demarcation becomes possible
through being carried out, since every utterance does what it does
through not being another utterance which would replace it, given another
situation.

Both Richards (1938) and Faris (1968) argued that the foundations of
comprehending are to be found in the development of language powers.
Opposition, in turn, finds expression by means of language. This study
attempts to explore the child's active engaging in comprehending printed
symbols and their comparable spoken utterances in order to determine
how opposition serves a cognitive role in this activity.

II. Perspectives in Cognitive Psychology Relevant to Oppositions

Language and its relation to cognitive phenomena may provide the key
to understanding the role opposition plays in cognitive phenomena. A
brief review will be made of various perspectives held in cognitive
psychology regarding the acquisition and role of language as it relates
to child growth and development.

Within the field of cognitive psychology there appear what Hess and
Bear (1968) refer to as two emergent camps: "That characterized by
Vygotsky" (and Whorf, Peirce,Dewey and Mead) "which attempts to under-
stand planning, reasoning and inference as derivative from internalized
language; the other, following Piaget, attempts to understand similar
phenomena as derivative from perceptual sequences, decentered, reversible
and grouped."

Vygotsky attempted to establish such concepts as perception, atten-

tion, memory, imagination, consciousness and action as not merely reducible to internal innate mental processes but as products of complex social forms or systems which emerge as a consequence of the child's activity within his cultural environment. For Vygotsky, these kinds of processes were viewed as refinements of complex reflexive acts arising as a result of the second signaling system. (as per Pavlov) Hence, the key to understanding the functioning of higher mental processes lay in the investigation of the re-organization taking place in mental processes as it appears with the emergence of speech. Verbal communication between child and adult formed the elementary roots for the mental development of the young child.... "a function which is earlier divided between two people becomes later the means of organization of the child's own behavior". (Luria and la Yudovich 1966, p.12) Thus, Vygotsky saw thought as being "internalized" speech.

With a similar orientation, Benjamin Lee Whorf makes two main hypotheses concerning the role of language in thinking. Firstly, he suggests that all higher forms of abstract or conceptual thinking are dependent upon the acquisition of language. Secondly, Whorf postulates that an individual's "world-view"is a product of his own particular language. Hence, Whorf would argue that man's ability to "think" his way out of problems has been his chief weapon of survival. Language, in Whorf's view, is seen as an organizing tool. It serves to re-order and re-direct experience and to facilitate interpretations of further experiences.

Whorf cites various languages and their corresponding thought patterns to illustrate his assertions. For example, Whorf examines how reality is organized in both European languages and the Hopi language.

European languages have resulted in the organization of reality mainly
in terms of what it calls "things" (bodies and quasi bodies) plus modes of
existential but formless existence generally referred to as "substances"
or "matter". (Whorf, 1956, p.147). Any existent comes to be seen and
expressed as a spatial form related to a spatial formless continuum.
A non-spatial existent is similarly imaginatively assigned as spatial
form and continuum.

In comparison, Hopi language has permitted the organization of reality
with an emphasis on what is "now" or to use Whorf's term on "eventing".
Reality is seen as a process of "eventing" thus leading to a view that
all earlier forms or "eventings" come to act as preparatory to all that
occurs in the future.

Further, Whorf asserts that it is directly as a result of western
language that men in this culture tend to make a provisional analysis of
reality and then operate as if this analysis were final. This latter
statement, perhaps, holds the greatest significance for those who are
theorizing about cognitive processes, and instructional design, among
other varied research endeavors.

By means of his intensive studies of various language systems Whorf
concluded that an individual is completely constrained within the bonds
of the language he uses. Behavior, in turn, is governed by specific
systems of organization related to the structure of each language.
Whorf attempted to solve this dilemma through the use of mathematical
formulas into which words, values and qualities could be substituted.

Richards and Ogden, on the other hand, have attempted to order or
provide an ordering for utterances in such a way as to invite compari-
son and reflection about how language works as the individual engages

in the active process of "languaging".

John Dewey, too, attempted to examine behavior as it relates to language acquisition. He believed that language must be examined in terms of viewing it as means to probable outcomes and as means in perceiving and examining probable futures. Hence examination at this level could provide directions for future appropriate behavioral transactions. Dewey would assert that it is because signs or behavior acquire "significance" or meaning in a social context that language becomes possible.

George Mead (1938, p.490) referred to this perspective when he said:

"Social differentiation is the function of what we call mental life. That is, each individual carries in his mental apparatus the social structure of which he is a part, through the symbols which answer to all the varied responses of those with whom he co-operates in the complexities of our communities...." (see also p. 15)

The notion that behavior, including language behavior, can only be examined in terms of environmental "situations" is crucial to the Dewey, Bentley, Mead position. This position did not place emphasis on opposition as a fundamental principle in evolving meanings. Rather, it looked to culture, or the individual as he functions in and comes to order social situations as the fundamental way in which meaning occurs.

Opposition is seen as effector or operative in some of these orderings such as the acts of naming where naming is viewed as an act of designation which serves to differentiate organism and environment in terms of kinds or qualities of probable behaviors. The split here is never existential, but rather, it is an abstraction.

If one can equate what Ogden and Richards refer to as opposition to what J. Dewey refers to as comparison there appear to be strong lines of agreement. Both positions would agree that it is impossible to define "opposition" or "comparison" other than operationally. Both views, too, assert that it is a concept which is intimately involved in all inquiries - almost to the degree that very often it is a principle left unexamined and hence taken for granted.

To return to look at the other "emergent camp":

Jean Piaget reflects another orientation toward the role of language in higher thought processes. In his view language arises as a result of internalization of behavior derived from perceptual sequences. Perceptual sequences become grouped by means of achievement of equilibrium between certain operations which have become organized into complex structures through action on the part of the individual with his environment.

Piaget's research endeavors are in essence a search to gain understanding of cognitive structures. These structures emerge as a result of various mental processes. In Piaget's view the processes of "assimilation" and "accommodation" are not only fundamental processes operating in the functioning of intelligent behavior but are also crucial in understanding all cognitive structures involved in human behavior. To quote Piaget (1963, p.7, 8) "...'assimilation' may be used to describe the action of the organism on surrounding objects, in so far as this action depends on previous behavior involving the same or similar objects... mental assimilation is thus the incorporation of objects into patterns of behavior, these patterns being none other than the whole gamut of actions capable of active repetition." Conversely, when the environment acts on the organism such as to require him to modify his behavior in order

to assimilate new conditions "accommodation" occurs.

"Accommodation" and "assimilation" are seen in Piaget's system as two complementary processes in dynamic equilibrium. They act to facilitate intelligent behavior, a phenomenon seen by Piaget as both process and product of assimilatory and accommodatory behaviors.

Language, in turn, is seen as a result of the evolution and refinement of imagery in the child. Imagery provides the means whereby the child can internalize environmental stimuli and re-organize these stimuli in terms of mobile and plastic mental schemata. Imagery provides the means for internal representation of external or environmental perceptions in the form of mental schemata. Both these processes, imagery and representation, are viewed as crucial components of cognitive processes and necessary pre-requisites for language acquisition in Piaget's system.

Representation occurs at the end of "Sensori-motor-intelligence". It is characterized by two types of behaviors on the part of the child. Firstly, representation occurs when a child becomes capable of delayed imitation. That is, he is able to replicate a copy of a behavior after the perceptual model for that behavior has disappeared. Secondly, representation occurs in the simplest forms of symbolic play such as when a child uses his body to produce an action incompatible with the present context; such as when he plays an adult role, or pretends to be asleep, or assumes any other make-believe role. Piaget asserts that these aforementioned types of representation and their enacted images serve to act as significants in the co-ordination of mental schemata. Concomitant with, and dependent upon the evolution of imagery to this stage, language becomes both facilitated and facilitator in further

adaptations. That is, the child, once having learned to use actions and images as symbols finds himself able to use words to serve him in a similar fashion.

The notion of opposition in cognitive processes, as asserted in this thesis, relates to Piaget's perspective in the following way. Environmental situations provide an invitation to require young children to engage in the processes termed by Piaget as "assimilation" and "accommodation". The very nature of these processes is such that, in fact, the child is presented with a direct invitation to make a number of comparings. Opposition, in turn, is seen as a means through which comparison or the making of comparings operates. Meaning, which in Piaget's system occurs by means of the formation of imagery and representational schemata, arises as a product of certain highly specific comparings. Initially, mental schemata in young children are characterized by various forms which are loose and plastic while yet in one sense global, and yet all these various forms remain isolated in terms of their related significance to one another. Formation of cognitive processes related to imagery and representation provide a progression out of this isolation. That is, until a child achieves sufficient assimilatory schemata (those schemata directly related to imagery and representation), meaning cannot be fully integrated and schemata relating to this integration cannot be"called upon" to act as "reference" or "starting" points for further comparings (and hence future accommodations).

Opposition enters the study of the emergence of mental schemata to provide another way of examining the active processes of assimilation and accommodation. The study of opposition, viewed in this manner, enables emphasis to be placed on how these environmental invitations to make

comparisons are perceived by young children.

In an operational sense the role of opposition in cognitive processes becomes part of the total structure of comprehending. Operations may involve comprehending and be involved in comprehending, but the sum of operations or of comprehendings does not explain either the tools put into action in learning or how learning comes about. In order to explore this problem, it seems reasonable to suggest that an analysis of cognitive processes in action is necessary in order to determine how the acquisition of these processes directs language acquisitions. It is assumed that a child's language in turn is transformed as new acquisitions are internalized. Specifically, it is hypothesized that "opposition" is one of the factors affecting this transformation.

### III. Opposition, Task and Learner

Tasks that will permit study of the role of opposition as it relates to the cognitive processes of "assimilation" and "accommodation" must include opportunities for comparison that may be examined both by the experimenter and child who is actively engaged in the tasks. Thus, too, the nature of these tasks must reflect a highly specific and controlled instructional design.

MacGinitie(1969) in evaluating current reading research makes comments which serve to emphasize this point quite aptly when he says..."The actual nature of the tasks should be analyzed and further research should be based upon this analysis, not on the names that happen to have been given to the tasks". In a similar vein, Margaret Donaldson (1963) argues that current research often attempts to hypothesize and explain behavior without fully knowing what the behavior actually is. Jeanne Chall (1967, p.101) too, commends the study of the relation of task to learner

as "very rare and worthwhile" when it is done as the learner is actively

engaged in a "controlled" learning situation. MacKinnon (1959) asserts

that success in comprehending instructional design is facilitated

when "tasks" presented to "learners" are of such a nature as to elicit

an order inherent in the "learners", rather than impose one.

In view of these and similar research findings it is suggested that

opportunities for comparison are the essence of instructional design.

Thus the problem for innovators of instructional design is to select

out opportunities for comparings such that comprehending across and

within "learners" is not only maximized but also readily accessible to

those involved in the continuing study of factors operative in cognitive

processes.

Initially then, opposition may be used as an instrument in studying

the intimate role of task and learner, if certain criteria pertaining

to the instructional design of tasks presented to the child for study are

met. Two principles guiding the selection of tasks are postulated.

Firstly, tasks selected must permit the comparings a child makes to be

overt and therefore observable. Secondly, tasks selected must contain

comparisons which are built into the instructional design in such a

manner that they can be controlled and specified.

Chapter Three extends these principles to form the design of this

thesis in an attempt to gain some understanding of the role of opposition

in the cognitive processes of "learners".

# CHAPTER III

## DESIGN

"In hewing an axe handle, the model for it is in our
hand." (Confucius)

### Introduction

The design for the study was chosen with a view to seeking further

understanding of how children engage in making comparisons and of the

role opposition plays in the making of these comparisons. Since the

study began in an area in which little research has been reported a

clinical-interpretative approach was taken. To date, no studies have

been published making use of the Language Master Machine which affords

simultaneous presentation of visual and aural stimuli under controlled

conditions. The present study is an exploration of the possibilities

of this machine.

Margaret Donaldson (1963, p.33) too, emphasizes the importance of

clinical studies as the first step toward finding answers to broad

general questions. "It is as a means of getting fruitful hypotheses

that the close and detailed study of individuals has its main value."

Donaldson argues that clinical studies should not involve attempts

at prediction. Instead, they serve at the "hypothesis finding stage and

therefore what emerges cannot be more than suggestive of further work to

be done". (Donaldson, 1963, p.33)

A distinction is made here between the project proposed and the kind

of research in which Jean Piaget and other developmentalists are engaged.

Specifically, Piaget's emphasis lies in the area of understanding the

development of the role of operations in anticipating the intrusions which

modify and compensate for all the representative systems. The study

proposed here is Piagetian in method in that opportunities for young

children to engage intuitively in comparings of specific situations will

be provided. It differs from Piaget's method in that it is postulated

that the materials alone will initiate these comparings. Therefore,

there will be no outside structuring of the situation by means of

direct questions. Through the child's participation in this kind of

invitation, it is hoped that the kinds of comparings he enters into, in

learning to comprehend printed symbols, will provide a better understand-

ing of the role and function opposition performs in cognitive processes.

Concomitantly, it was hoped that the design would provide opportunities

for an intensive examination of the child as he engaged in activities

leading him to a discovery of a property or properties of the action of

ordering in terms of learning to read printed symbols. It is hypothesized

that opposition performs a crucial role in the "learner's" action of order-

ing phenomena in a meaningful way.

### Selection of Subjects

Children were chosen at random from two kindergarten classrooms in

the city of Vancouver School System. (Randomness was taken at its

literal meaning and therefore equal numbers of boys and girls were not

selected.)

### Materials

(1) Selection of material for the presentation cards

Certain kinds of controls were seen as necessary. Richards-Gibson

reading materials were chosen for the presentation cards because they

provide controls which have been determined. MacKinnon (1959) used Richards-Gibson materials in studying how young children learned to read. He found that these materials permitted the "learner" to identify more clearly the tasks he must undertake, and attributed this relative ease on the part of the "learner" to the careful ordering and sequencing of tasks presented, and to the control of complexity in design. MacKinnon also emphasized that the Richards-Gibson materials enabled "learners" to move on to tasks of increasing complexity while at the same time being able to confirm at each stage what had been accomplished beforehand. The Richards-Gibson materials place emphasis on a small number of picturable words, clearly related to unambiguous non-verbal abstractions, and connected by a high proportion of "operation" words which gave the learner many opportunities to view "how language works."

Thus the sentences and pictures forming the ten presentation cards were selected from Richards-Gibson materials. Examples of these cards are found in the Appendix.

(2) The Language-Master Machine

The Language-Master machine was chosen as a means of presentation of the material to young children since it permitted the study of individual responses, provided for simultaneous presentation of aural and visual stimuli, and also permitted exploration on the part of the child in ordering his own presentation of cards to the machine. The magnetic-tape running along the bottom of each Language-Master Card enables the child and the experimenter to record what has taken place.

(3) The Draw-A-Classroom Test and The Goodenough-Harris Drawing Test

These tests were administered and scored in compliance with the directions given in the manuals (Harris, 1963 and Toronto Board of

Education, 1966)

These tests were chosen in order to obtain some measures of "process" and of the ways in which opposition, acting to facilitate comparisons is reflected in overt responses, in turn reflecting cognitive processes. Research to date indicates that the kinds of attention or perhaps the kinds of comparing the child makes in learning to do one task, are transferred to the kind of attention he pays to another task. However, no studies reporting what kinds of cognitive tools are involved in the changes which occur, or how the transfer of attention comes about have been published. (MacKinnon, 1959; Toronto Board of Education, 1966) With this view in mind, the two tests cited above were used in the hope of being able to formulate hypotheses about factors involved in this "transfer of attention".

Experimental Procedures

In this study children were permitted to order the materials presented to them in an intuitive fashion. It was postulated that, if a child is permitted freedom in the ordering or sequencing of materials for learning, this factor would, to some extent, render overt the kinds of opposition used in action. MacKinnon (unpublished study done with Collins) found that when children were given opportunities to order their own presentation of carefully designed materials, their success in comprehending the instructional design was at least equal to the competence shown by a matched group of children who were required to use a predetermined linear sequence in ordering the presentation of identical materials.

The children selected for this study met with the experimenter on

eight separate occasions.  At each of the eight sessions a tape recorder

was used to record verbal behavior.  The experimenter also recorded all

behavior on a master sheet for each child.

Description of the Eight Sessions.

Session One.  Ten children at one time met with the experimenter.  The

Goodenough-Harris and The Draw-a-classroom Test were administered

according to standardized instructions.

Session Two.  Each child met individually with the experimenter and was

given the following set of instructions.

> "Do you know what this is?  (experimenter pointed to the Language
> Master Machine)  It is a machine that can do something very special...
> It can read.  Watch and I will put this card into the machine.
> What did you hear?  What do you see on the card?  Now, you do what
> I did with the card....  Here are ten cards.  Use the machine to
> help you read them.  When you are finished with a card put it
> down and choose another card or you may put it into the machine
> again if you want to.  Do you understand?"

During this meeting and for the three following meetings the child was

permitted to "work" with the cards as long as he wished.  Usually he chose

to stop before the outside time limit which was set at twenty minutes

per session.

Sessions Three, Four, and Five.  During these meetings the child met

individually with the experimenter.  Each time he was asked if he

remembered what he did last time and then he was requested to go on and

"work with the cards" as before.

Sessions Six and Seven.  These sessions followed the same format as

Sessions Three, Four and Five with the experimenter meeting each child

individually.  During Session Six, one half of the children were instructed

as follows:

> "Here are ten sheets of paper exactly the same as the ten cards
> you have been working with.  Each sheet of paper has the pic-
> tures missing.  Can you put in the pictures so that they will

look like the ten cards you have been using?  Do you understand?
Here is a pencil for you to use."

The remaining half of the children were given the following instructions:

"Here are ten sheets of paper exactly the same as the ten cards
you have been working with.  On each sheet of paper something
has been left out.  Can you tell me what has been left out or
show me with your pencil?  Then we will read the card to the
machine so it can record your voice.  Do you understand?"

During Session Seven the above order was reversed.

Session Eight:  This session was a repetition of Session One.  As before

the maximum time limit of 20 minutes was observed.

In all sessions the experimenter offered no assistance but merely

observed and recorded all behavior.


Analysis of Data

Guidelines summarized below were devised for analyzing the data.

(1) Goodenough-Harris Standard Scores obtained in Sessions One and Eight

were compared and significant changes noted.  (Significance was taken to

be 5 or more I.Q. points as per the manual.  Harris 1963, p.99)

(2) The Draw-a-Classroom Test (verbal responses) recorded in Session One

and Eight were used to explore the kinds of "indicating" the children

attended to.  Verbalizations were analyzed and weighted according to the

following criteria listed below.  (MacKinnon 1959)  (Only the first four

categories of the six that MacKinnon used were selected, since the ten

presentation cards include only these patterns of utterances.)

| Category of Utterance (Structural Form) | Weighted Score |
|---|---|
| (a) Naming - only | 1 |
| (b) Pointing - naming | 2 |

(c) Pointing – naming pattern extended to        3

note specific characteristics of the

physical or human situation.

(d) Pointing – naming pattern extended to        4

locate objects and persons in space or

time.

(3) The Draw-A-Classroom Test was scored according to the qualitative

coding categories in the manual.

(4) Drawings obtained in Session Six were analyzed in terms of the follow-

ing criteria:

   a. correct completion

   b. hesitation (no response given)

   c. omission

   d. substitution

   e. repetition

   f. insertion

This technique is derived from that used by other researchers in record-

ing reading successes and failures (see McCullough, Strang, and Traxler,

1946, Chapter 5 and MacKinnon, 1959).

(5) Utterances recorded in both Sessions Six and Seven were also scored

according to the criteria established in items No. 2 and No. 4 above.

(6) Protocols for cards One through Ten were made for Sessions Six and

Seven.  These protocols were used to explore patterns and trends reflect-

ing the children's use of opposition in comprehending.

<center>Definitions of Terms</center>

<u>Opposition</u>.  The present study was designed first, in order to control

certain kinds of oppositions in the instructional design of selected materials and secondly, in order to render overt the child's exploration of the materials. The control of oppositions employed were those necessary for the isolation and presentation of simplified components of language. (Richards, 1968, p. 58)

The presentation cards, to which each child was exposed, contain elements of opposition that may be specified. These elements are categorized and listed below.

First, opposition is involved in the move from the general to the specific. That is, the child, through exposure to the ten cards is required to sort out simplified components of language and focus on them in order to "move on" to perceive other oppositions within the ten presentation cards. Structural patterns can be observed and their variations compared with one another. For example: "Pointing-naming characterizing" utterances (This is his hat) with "Pointing-naming-locating" utterances (This hat is in his hand). Secondly, opposition comes into action when a child enters into comparisons of verbal symbols and their picturable counterparts. For example: "This is a man" (Card One). The verbal symbol "man" is placed in opposition to the stick figure of a man. Thirdly, opposition becomes a means for comparing two verbal symbols such as "man" and "hat" that are contained within the same presentation card. For example: "This is a man". "This is a hat". Also, two verbal symbols may be juxtaposed with the illustrations of their picturable counterparts. Fourthly, opposition can enter into the structure of an utterance to engage the 'learner' in a discovery of how changes in structure result in subsequent changes in meaning. For example: "This is his hat", and "It is his hat", or "This is a hat",

and "This is his hat". Fifthly, opposition can function to provide
the 'learner' with a tool to explore non-picturable symbols with their
picturable counterparts. Consider the utterances: "This is a man", and
"This is his hat". "His" is a non-picturable abstraction which gains
meaning through its location within the total sentence situation in
which it occurs. Lastly, opposition functions as a cognitive tool in
terms of the child's exploration of words that perform operational
functions in sentence situations. For example: "This is a hat". "It
is in his hand". "Is" can be contrasted or placed in opposition to
"is in" and resultant changes in meaning observed. These kinds of
contextual comparings permit the learner to explore actively the sorts
of work these utterance patterns perform. He can actively and readily
begin to observe, compare and contrast how changes in what is "spoken"
and "written" in turn reflect changes in what is "meant".

Intuitive. Intuitive knowledge refers to "knowledge" or "knowing"
that is in some sense immediate. This kind of knowledge "is not know-
ledge in the sense of a justified assertion that a state of existence is
thus-and-so". (Dewey, 1938 p.143) Rather, it consists of a "grasping"
intellectually without questioning. It occurs by means of prior experi-
ences and habits. Subsequent mediated conclusions drawn about these
experiences and habits, in turn, are related to the existential situa-
tion at any given moment.

In this study "intuitive" refers directly to this type of knowledge
as the child uses it in his immediate grasping or understanding of the
meaning content of the instructional materials presented to him. It is
an attempt to let him exhibit his own methods of ordering of his
experiences in ways meaningful to him as a "learner".

Cognitive Processes. In this study, the term "cognitive processes" is used to refer to that behavior which is commonly designated as "thought". It refers specifically to the abstract side of thought, focusing on the ways in which "thought" or "thinking" is ordered to become useful in assimilating new experiences or environmental intrusions. Behavior is "cognitive" when it is "representative" and can therefore evoke responses. Thus "cognitive" behavior is representative, both in the abstract (symbol or written) and in the social-cultural sense.

"Cognitive Processes" then become the ways in which the child "orders" his world. In this thesis they are reflected in his overt behavior through the ways he chooses to respond to the kinds of opposition he perceives structured within the experimental materials presented to him.

## Concluding remarks

Tasks were designed and presented to children in order to explore the role of opposition in cognitive processes. Young children were invited to engage in making and recording some of their comprehending of oppositions designed in the experimental materials with which they worked. Results of these endeavors are reported in Chapter Four.

# CHAPTER IV

## RESULTS OF THE INVESTIGATION

"Yet if scientific method is not something esoteric but
is a realization of the most effective operation of intelli-
gence, it should be axiomatic that the development of scientific
attitudes of thought, observation, and inquiry is the chief
business of study and learning." (John Dewey)

I. A. Richards, reflecting a similar viewpoint, says about inquiry,

that "all thought is sorting" and "logic is the art or the discipline of

managing our sortings" (Richards, 1949, p.359 f.f.) which therefore must

be studied in a context related to everyday affairs. Hence, the results

of this investigation stem from an active attempt by the researcher to

observe and record children's behavior as they proceeded through the

"mental-sortings" involved in comprehending printed symbols in contexts

under controlled conditions.

The Goodenough-Harris Drawing Test and the Draw-a-Classroom Test were

used in an attempt to make a global analysis of changes that occurred in

the children as a result of having experienced exposure to the experimental

materials which contained oppositions presented in controlled patterns.

These tests were used at the outset and at the completion of the research.

It was postulated that these tests might also tap something of the kinds

of "transfer of attention" that occurred between these tasks and the

tasks set in Sessions Two to Seven. (refer to Chapter Three p.27)

Secondly, protocols for each of the ten presentation cards in Sessions

Six and Seven were computed. They were examined for instances of

opposition according to the specifications met within the ten presen-

tation cards. (see Definition of Opposition, Chapter Three, p.29)

Thirdly these protocols were summarized and related to the global analysis

of changes.

Part I:  Global Analysis of Changes

Analysis of the Goodenough-Harris Drawing Test

The Goodenough-Harris Drawing Test was administered at the outset

and at the completion of the research.  Standard Scores were computed

in accordance with the manual.  (Harris, 1963)  Scores were then examined

for "significant" differences.  "Significance" was taken to be a change

of five or more points in the Standard Scores as per the manual.  (Harris,

1963, p.99)  On this basis, nine of the eleven scores which increased

were considered to be significant and all five scores that decreased

were considered significant.  Four standard scores remained unchanged.

Tabulation of the items causing nine standard scores to show a

significant increase was carried out.  Changes causing additions to the

standard scores occurred in the following five categories:  (1) Item #24,

addition of fingers; (2) Item #45 - attachment of the arms and legs at

the correct place and in proportion; (3) Item #51 - proportion relating

to the arms; (4) Item #55 - addition of any indication of clothing

(most often a hat) and (5) Item #63 - indication of better motor co-

ordination.  These changes were the only items where more than half of

the nine increased standard scores showed additions.  (See Table I for

a detailed tabulation of all the items producing additions to the

standard scores obtained in Session Eight)

Examination was made to determine the relation between the five items

causing significant increases in nine Standard Scores and the inclusion

of these items in Standard Scores of the four children who showed no

change.  It was found that these four children had already taken note of

three or more of the five items in the first testing and went on to

TABLE 1

RELATION OF ITEMS SHOWING A SIGNIFICANT* INCREASE IN THE STANDARD
SCORES OF THE GOODENOUGH-HARRIS DRAWING TEST AND THE TEN
PRESENTATION CARDS

| Goodenough-Harris Items | Description of Item | Related Presentation Cards** |
|---|---|---|
| #24 | addition of fingers | Cards 6 & 7 |
| #45 | attachment & proportion of arms & legs | Cards 1, 3, 4, 5, 8, 9 & 10 |
| #51 | proportion re-lating to arms | Cards 1, 3, 4, 5, 8, 9 & 10 |
| #55 | any indication of clothing | Cards 3, 9 & 10 |

*Significant (Harris, 1963, p.99).

**Appendix

include these items in the second testing also.    (Table 2.)

For the nine children who showed significant increases in their scores, "deletion" of items on the second testing was also examined. Since no item was deleted by more than one or two subjects, from the first to the second testing, no hypotheses were formulated in this regard. Lastly, examination was made of the four subjects who showed significant decreases in the Standard-Score obtained in Session Eight (Again "significance" was interpreted as suggested in the manual [Harris, 1963, p.99]) and was therefore defined as a decrease of five or more points). Two of the five subjects were considered by the experimenter to be not feeling well. Thus further examination of the additional three subjects was considered not profitable.

Analysis of the Draw-a-Classroom Test (DAC)

(a) Analysis of the Drawings. This test was administered following the directions suggested in the manual. (Toronto Board of Education, 1966). On both test occasions the pictures the children drew and their verbal utterances made about their pictures were analyzed.

Briefly, the Draw-a-Classroom Test is analyzed as follows: Each drawing is scored under five categories. The five categories include: SPACE, PERSONS, DRAWING-THE-PERSON, CONSTANTS and OBJECTS. Within each category, each drawing may be scored on a number of items and assigned a qualitative code number for each item. There are no "right" or "wrong" answers on this test. It is an attempt to permit tabulation of the ways a child uses drawings to record what he has taken note of in his environment. It is considered by those who designed the scoring categories to measure "over-all growth", not merely "intellectual" ability.

In this study, two of the five scoring categories had to be deleted.

TABLE 2

ANALYSIS OF INCLUSION OF FIVE ITEMS BY THOSE CHILDREN WHOSE
GOODENOUGH-HARRIS STANDARD SCORES REMAINED UNCHANGED (N=4)

| Item No. | Description | Test I | Test II |
|----------|-------------|--------|---------|
| #24 | addition of fingers | 4 | 4 |
| #45 | attachment and prop. of arms and legs | 4 | 3 |
| #51 | prop. of arms | 1 | 2 |
| #55 | clothing | 4 | 4 |
| #63 | motor co-ordination lines | 4 | 4 |

This resulted from the fact that only five subjects included persons in Session One while three subjects included persons in Session Eight, and only one of these subjects included persons on both test occasions. Thus, no comparisons by the experimenter were possible.

The three categories of SPACE, CONSTANTS and OBJECTS were then coded and changes between the first and the second testings were tabulated. Little information emerged. With regard to the SPACE category less than one quarter of the children showed changes on nearly every item. Two items were exceptions. From Test One to Test Two, many more children included a top-boundary in their drawings. This usually took the form of a row of lights similar in design to those rows found in their classroom. In the second testing the children tended to use more of the page for their drawings and their allocation of space improved. There appeared to be more evidence in "planning" the ways in which the space on the page was taken up, and a better attempt to make a unified whole occurred. Test One showed many more instances of somewhat disjointed items stuck on the page in random fashion.

Analysis of the CONSTANTS category showed a similar lack of change from the first to the second testing. Again two items were exceptions. Addition of lights appeared on the second testing, and more classroom pictures located on bulletin boards were included. In one third of the children there appeared to be some move to show constants as grouped appropriately; not as much "dissociated floating" of constants appeared. Changes in two other items in the constants category seem worth mentioning. One-half the subjects added children's furniture and children's chairs in the second testing. This was not included in the first testing.

Analysis of the OBJECTS category proved to be almost void of any

changes in the way items were coded from the first to the second testing. The only change noted was related to the seven crayons the children were given to make their drawings. From one testing to the next, half of the children changed not only the predominant color, but also the number of colors they used increased to include five or more.

(b) Analysis of Verbal utterances about the Drawings. Verbal utterances telling about the DAC drawings were analyzed in an attempt to determine the kinds of indicating each child attended to in Sessions One and Eight.

All twenty children in the study made drawings of their classrooms on both test days. These children made a total of one hundred eleven utterances about their drawings at Session One and a total of one hundred twelve utterances at Session Eight.

The criteria used for determining what a unit of speech termed "an utterance" consisted of was adopted from that used by MacKinnon (1959, p.183). MacKinnon classified a unit of speech as an utterance if it met two criteria: First, to be termed an utterance a unit of speech had to occur between periods of silence. Secondly, there had to be an indication of a shift in what the children were pointing to in the drawings they had made.

Four of the six criteria MacKinnon (1959, p.185) used to establish the kinds of indicating a child attended to were selected for the study of verbal utterances made about the D.A.C. task. The other two were not selected since none of the ten presentation cards contained these utterance patterns. The four categories used in this study are described below:

(i) <u>Naming utterances</u>. Utterances falling into this category consisted of names of things or persons with no accompanying structural words (for example: boy; Rita; lights; tables).

(ii) <u>Pointing-naming utterances</u>. These utterances consisted of "naming" as in the category above and included an accompanying structural form.(for example: "This is a door" or "These are lights").

(iii) <u>Pointing-naming utterances</u> extended to note characteristics of the physical or human situation:

Here qualifiers such as "his", "hers", "my","its", "size", color or number were used.(for example: "This is Susan's Table", or "This is my hat").

(iv) <u>Pointing-Naming-Locating utterances</u>. Here, objects or persons named were also located in space or time. The use of words such as "at" or "in" or "on"; "here" or "there" was observed.(for example: "Hanley is at the Science table". "Here is the cupboard my shoes are in").

All the utterances made on the first and second testing were scored as falling within these categories. Percentages showing the various incidences of utterance patterns were computed. These percentages are shown in Table 3 below.

As Table 3 shows, utterances made in the first testing situation contained the highest percentage of "naming-only" structural forms. The next highest category was that of utterances consisting of "Pointing-Naming" patterns. Test II showed a direct reversal of percentages of utterances in these two categories. This result would seem to indicate that something of the structural forms within the ten presentation cards had been noted by the children and a transfer of this information to another task (that is the Draw-a-Classroom Test) had occurred.

TABLE 3

PERCENTAGE OF UTTERANCES FROM THE DRAW-A-CLASSROOM
  TESTS ACCORDING TO VARIOUS STRUCTURAL FORMS
  (TOTAL NUMBER OF UTTERANCES ON TEST 1 = 111;
  TOTAL NUMBER OF UTTERANCES ON TEST II = 112.)
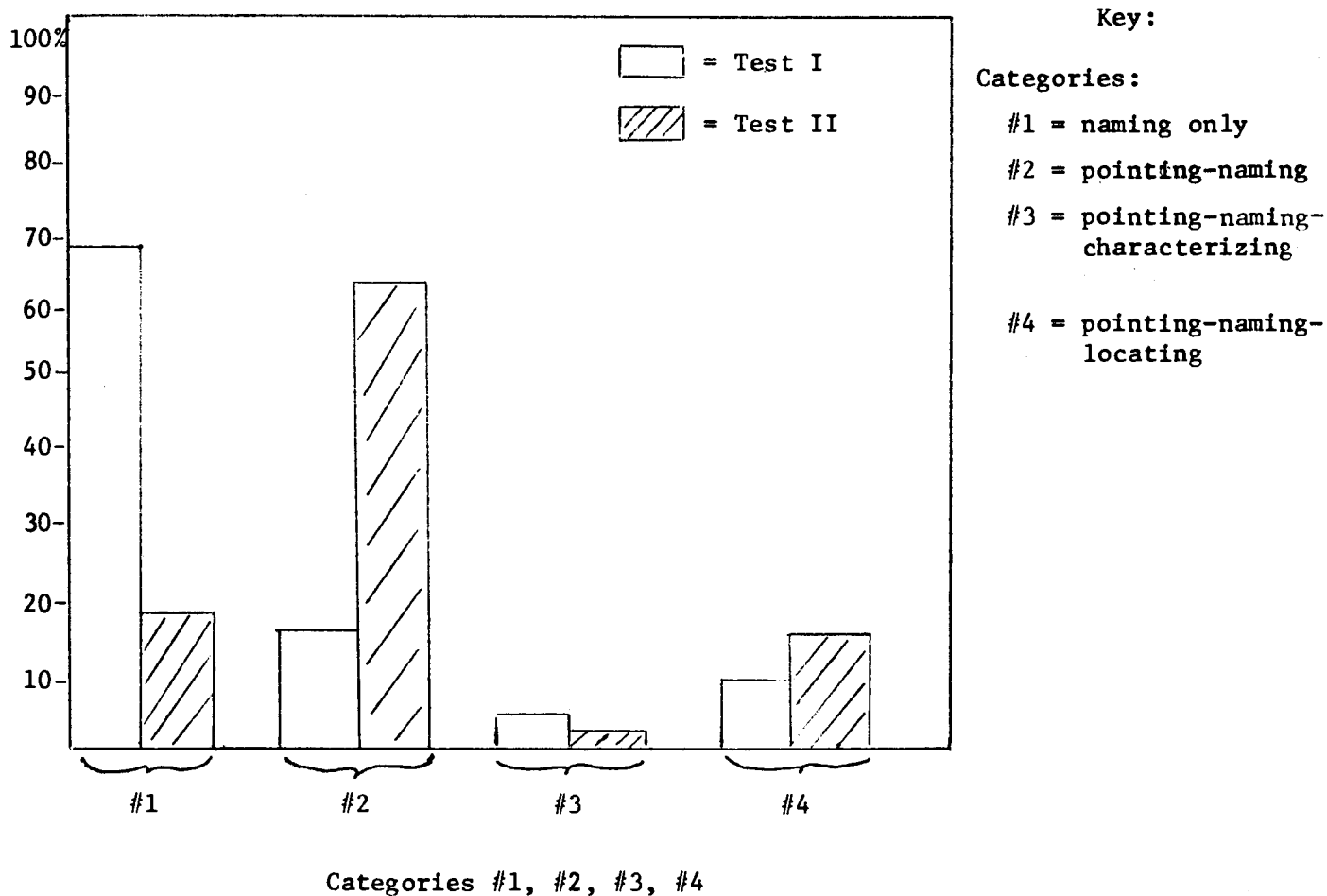


Categories #1, #2, #3, #4

Next, weighted score totals for each subject on each utterance were

scored according to the criteria established in Chapter Three (see p.28).

That is, arbitrary scores were assigned to each of the four categories

as follows:

      Category #1 (naming only)       = 1

      Category #2 (pointing-naming)    = 2

      Category #3 (pointing-naming     = 3
                characterizing)

      Category #4 (pointing-naming     = 4
                locating)

A weighted score of each child's utterances was calculated for Test

I and Test II situations. The difference between the scores was

obtained by subtracting the first score from the second score. Then

the mean difference for the group was calculated. Table 4 shows the

means and mean differences of the weighted scores for the two test

situations.

The weighted mean scores for the children studied increased from

Test I to Test II occasions. Individual weighted scores were also

examined and it was found that all but four individuals showed increased

weighted score totals.

<div align="center">Summary of Global Analysis of Changes</div>

The global analysis of changes resulted in one major finding. This

consisted of a move from a "general" category to more specific category.

In the Draw-a-Classroom Test, the total number of utterances made

by the children remained almost unchanged (see Table 3 p. 41), but a shift

in the structural form the children used to report about their drawings

occurred. That is, the structural forms of language the children used

TABLE 4

MEANS AND MEAN DIFFERENCES OF WEIGHTED
SCORES FOR UTTERANCES ON DRAW-A-CLASS-
ROOM TEST
(N = 20 CHILDREN)

| Means | | Mean |
|--------|---------|------------|
| Test I | Test II | Difference |
| 6.600 | 13.850 | 7.250 |

on the second testing more closely approximated those structural forms found in the ten presentation cards. Opposition operated here, in providing a focal point from which the child made comparings about how he ordered his own speech, and the manner in which "speech" was ordered within the experimental materials. Comprehending of the elements of opposition related to positioning and comparing of structural forms within the ten cards is also indicated by the low percentage of utterances in the naming-only category on the second testing (see Table 3). The children tended to model their speech in the manner suggested by the experimental materials. One additional finding is evident in Table 3. During both testing days a higher percentage of utterances appeared in Category Four (pointing-naming-locating) than in Category Three (pointing-naming-characterizing). MacKinnon (1959) found that these four categories were arranged in order of increasing complexity and indicated an ability on the part of the child to handle increasingly complex meanings. The results of this study do not wholly support this finding since the children observed appeared somewhat more able to handle Category Four than Category Three structural forms. (see also Eson, 1964)

In contrast, little evidence emerged to suggest opposition was operative in any changes that occurred in the drawings the children made. There were few indications that the children moved from a general to a more specific interpretation and then represented this move in their drawings. They did evince more evidence of planning in their second drawings. Space was more carefully allocated, constants (such as lights, chairs, tables, windows) were drawn and grouped appropriately. (see analysis of constants p. 38) The experimenter could find little evidence to support the notion that a transfer of the kinds of attention paid to

the tasks of Sessions Two through Seven were represented in the drawings

the children made of their classrooms during Session Eight. However,

this transfer was dramatically evidenced in the changes that occurred in

the speech patterns the children used to report on their drawings in

Session Eight. (Table 3) Lastly, the absence of the inclusions of

persons in the drawing task at both sessions may be a result of the

literal interpretation of the instructions given (by the five-year olds

studied).

> "I am going to ask you to do something very special for me.
> I want you to make a picture of our room. Look all around
> the room and then draw a picture of our room on the paper."
> (Toronto Board of Education, 1966)

Since no persons appeared on the second testing, further evidence to

suggest a lack of "transfer" with regard to the drawing taks is indicated.

The Goodenough-Harris Drawing Test also gave support to suggest that

opposition (as it was designed in the experimental materials) resulted in

a move from the general to a more specific kind of discrimination or

categorization by the children. Five items included in the drawing of a

man on the second testing caused Standard-Scores of those children who

included these to show significant increases (see p. 34). All five of

these items appear to relate in some way to the experimental materials.

(see Table I) The drawings of the man on the experimental materials

called the child's attention to his own drawing of a man. He took note

of specific features of the "man" on the ten presentation cards and

"moved" to include these in his own drawing of a man. Thus, these com-

parisons he made caused him to add fingers to a hand and clothing (most

often a hat), to draw a man with more accurate proportions, and to take

more care in the execution of his drawing resulting in the appearance of

better motor co-ordination lines (item #63). Conversely, when a child's score remained unchanged (p. 37 Table 2) it was found that he had already taken note of three or more of the five items found to cause additions to the scores of those children who showed significant increases. In these children, the comparisons they made about the man on the ten presentation cards served to reinforce what they had already put into their drawing of a man, on the first testing occasion, and hence this reappeared in the second drawing also.

### Part II: Analysis of Sessions Six and Seven

Responses of the twenty children to the tasks set in these sessions are reported in the protocols outlined below. These protocols were then examined for instances of opposition (indicated by * in the margin beside the protocol) as specified in the design of the instructional materials. (see Chapter 3 p.29) A simple form of vector notation was used for each protocol. For example: 1:6 appearing in the margin designates the protocol for card One in Session Six.

Part III provides a summary of the kinds of oppositions comprehended by the children in Sessions Six and Seven and then relates these results to the global responses described in Part I. The number beside the marginal stars (*) indicates a level or kind of opposition summarized in Part III.

### Analysis of Session Six: "Put in the Pictures"

Two tables were drawn up summarizing first the number of correct picture completions for each card and the frequency of the kinds of errors made; second, the number of correct verbal responses and the kinds and frequency of errors in verbal responses made to each card. Protocols, showing a more detailed reporting of results were then made.

TABLE 5

SUMMARY OF THE FREQUENCY OF ERRORS IN RESPONSES
TO THE PICTURE COMPLETION TASK IN SESSION SIX
(N = 20)

| Card Number | Correct Completion | No Response | Omission Error | Substitution Error | Repetition Error | Insertion Error |
|---|---|---|---|---|---|---|
| 1 | 14 | 1 | 0 | 5 | 0 | 0 |
| 2 | 8 | 2 | 3 | 6 | 0 | 3 |
| 3 | 3 | 2 | 9 | 4 | 0 | 4 |
| 4 | 3 | 2 | 7 | 5 | 0 | 4 |
| 5 | 3 | 4 | 5 | 4 | 1 | 6 |
| 6 | 1 | 3 | 9 | 9 | 1 | 7 |
| 7 | 1 | 7 | 4 | 3 | 0 | 6 |
| 8 | 3 | 3 | 5 | 1 | 0 | 8 |
| 9 | 0 | 7 | 6 | 1 | 0 | 7 |
| 10 | 0 | 3 | 8 | 2 | 0 | 8 |

TABLE 6

SUMMARY OF THE FREQUENCY OF ERRORS IN RESPONSES
TO THE VERBAL RESPONSE TASK IN SESSION SIX
(N = 20)

| Card Number | Correct Completion | No Response | Omission Error | Substitution Error | Repetition Error | Insertion Error |
|---|---|---|---|---|---|---|
| 1 | 10 | 2 | 2 | 6 | 0 | 1 |
| 2 | 4 | 2 | 2 | 8 | 0 | 4 |
| 3 | 1 | 3 | 4 | 9 | 0 | 5 |
| 4 | 1 | 3 | 5 | 7 | 1 | 5 |
| 5 | 1 | 6 | 0 | 4 | 2 | 7 |
| 6 | 1 | 5 | 4 | 3 | 0 | 9 |
| 7 | 0 | 9 | 2 | 1 | 2 | 7 |
| 8 | 0 | 4 | 1 | 6 | 1 | 11 |
| 9 | 0 | 5 | 4 | 4 | 1 | 10 |
| 10 | 0 | 6 | 4 | 5 | 1 | 9 |

Protocols for Session Six

1:6    This is a man:  (Pointing-Naming Structural Form)

Fourteen of the twenty children correctly completed the picture on this

(*4) card; only ten of these children correctly "read" this card.  Only one

child refused to draw a picture and two children said they could not

"read" the card.  These two appeared to have realized that the "words"

(*3) printed on the card said something specific which they could not repeat.

The other children who failed to give a correct picture completion all

substituted one of two other pictures:  a hat or a hand.  Conversely,

the children who failed to read the card correctly made a variety of

errors and frequently more than one error at a time.  The majority of

the errors were substitution errors where some other utterance con-

(*6) tained within the ten cards was given in response to this card.  For

(*1) example:  The child told about the picture he drew.  "This is a hat".

"This is a hand".  "It's a man".  It appeared, in connection with these

kinds of errors, that the child had compared the utterance patterns he

had heard with his own speech and had re-ordered his responses to

comply with what he had heard.  Other errors consisted of omissions

following the "naming-only" structural form.  For example "a hat", "a

hand", "a ball".  One child failed to comprehend the constraints of the

(*5) task set and inserted a totally irrelevant response..."a ball".

2:6    This is a hat.  (Pointing-Naming Structural Form)

(*4) The number of correct picture completions to this card dropped to eight,

---

*= Indication of use of opposition (built into the instructional design)
to make comparisons which are in turn reflected in these responses.
The number beside the star reflects the way this level of opposition
is summarized in Part III.

(*4) and only four of the children were able to "read" the card correctly. Omission and substitution errors increased. "Here" and Its" were frequently substituted for "This" and "This is". The number of insertion errors increased also. An error was classified as an

(*5) insertion if it appeared to be completely arbitrary and bore no apparent relation to the experimental materials as given. As in 1:6, these errors consisted of the child drawing a ball, an airplane etc., and then giving a verbal response telling about the picture he drew. - "It's a ball" or "an airplane". Three quarters of the children

(*4) patterned their verbal response to this card in the same structural form of the card - that of "pointing-naming", even though the content they gave was incorrect.

3:6    This is a man. This is his hat. (Pointing-Naming Characterizing) On this card, the number of errors exceeded correct completions on both the picture and verbal responses. The number of children realizing

(*3) that the words on the cards said something specific which they could not comprehend remained approximately the same. Omission errors exceeded substitution errors on the picture completion task, but substitution errors occurred more than twice as frequently than any other type of error on the verbal response task. Omissions in the picture completion most frequently consisted of drawing just a man and leaving out the hat. Often a hand, drawn separately, was substituted for a hat. Insertion

(*5) errors appeared such as "a dog", "a house" or "a car". Again verbal utterances closely adhered to what was drawn. "Here" was substituted for "this" and "hand" substituted for "hat" or "man". "Pointing-Naming

*=Indication of use of opposition (built into the instructional design) to make comparisons which are in turn reflected in these responses. The number beside the star reflects the way this level of opposition is summarized in Part III.

(*1) Characterizing" structural forms were used. For example: "a man with

a triangle head"; "This is a man's hat". Three children gave verbal

responses of two sentences patterned after card 3. All the other

(*1) children responded with only one sentence. In all but one instance,

this sentence contained a "pointing-naming-characterizing" structural form.

4:6    This is a man. This is a hand. (Pointing-Naming Structural Form)

(*6) Both picture and verbal responses to card four were frequently confused

with card three. This may in part account for the marked similarities

found between these two cards in the number of correct responses and

in the summary analysis of errors (see Tables 5 and 6). "Its" was

substituted for "this" on one occasion. Three error responses occurred

as "naming-only" structural forms. For example, "a man", "a refrigerator",

(*2) "a hand". The other structural form evident in the verbal responses was

contained within one sentence and consisted of adherence to a "Pointing-

naming-characterizing" pattern.

5:6    This is a man. This is his hand (Pointing-Naming-Characterizing

Structural Form)

With this card several changes in trends emerged. The number of correct

(*4) completions remained identical to 3:6 and 4:6. The number of children

who were able to recognize that they simply did not know increased.

(*3) With the increasing awareness of this fact individuals responded in a

variety of ways. Some simply stated "I don't know" and requested to go

on to the next card. Others repeated verbatim what they had done on the

(*2) card immediately preceding. Others who had already started to make

(*5) irrelevant insertions on previous cards continued in this pattern from

here on.

_____

*=Indication of use of opposition (built into the instructional design)
to make comparisons which are in turn reflected in these responses.
The number beside the star reflects the way this level of opposition
is summarized in Part III.

Omission errors disappeared since, of those who chose to respond, over half made irrelevant insertions. The remaining half either

(*2) repeated the response given to 4:6 or substituted "here" or "a" for "this" and "hat" or "man" for "hand". Verbal responses showed all four structural forms. One instance of "pointing-naming-locating" and two instances of "naming-only" occurred. Over one-half of the remaining

(*1) responses were "pointing-naming-characterizing". The remainder of the children used a "pointing-naming" utterance pattern.

6:6    This is a hat and this is a hand. (Pointing Naming Structural Form) One child was able to accomplish the picture completion task correctly

(*4) and make a correct verbal response. Errors which occurred in the picture completion task took on several different forms. Three children

(*3) declined to make a response. Seven children made irrelevant insertions. For example: They drew one of: a horse, a house, a car, a building, or

(*5) a snowman. Omission errors occurred in two ways. First, either a "hat" or a "hand" was drawn, one or the other being omitted. Secondly, a man was drawn either with a hat on, or having hands. No instances of both items occurring together were found. Substitution errors consisted

(*6) of substituting the drawing of a man for the relevant pictures.

Verbal responses to this card showed the insertion of irrelevant

(*5) utterances claiming the highest number of all responses. Half the

(*3) remainder of the children chose to make no verbal response while the other half committed omission and substitution errors about equally.

---

*=Indication of use of opposition (built into the instructional design) to make comparisons which are in turn reflected in these responses. The number beside the star reflects the way this level of opposition is summarized in Part III.

"Hand" and "hat" were confused. "Man" was substituted for "hand" or "hat" or one of these three variables was simply omitted. There was a failure to adhere to the "pointing-naming" structural form of 6:6; four instances of "naming-only" occurred. The remaining two structural forms appeared in equal proportions.

7:6    This is his hat and this is his hand. (Pointing-Naming Characterizing Structural Form)

(*4) This card marked the end of any correct verbal responses. One correct picture-completion occurred. Despite the apparent similarity of 6:6 to this card (7:6) there were no repetitions of pictures drawn and only two repetitions of verbal responses given for 6:6. On both verbal and picture completion tasks over half the children either stated "I don't

(*3) know" or made an insertion similar to those made or earlier cards such

(*5) as "a horse"; "a T.V."; "a cow". Substitutions consisted of a "man" with either "hat" or "hands", but not both occurring together. In other

(*6) instances a man was substituted without hat or hands. Omissions, then, were simply either a hand or a hat whichever was not included in the substitution.

8:6    It is his hand. (Pointing-Naming-Characterizing Structural Form)

(*4) Three correct picture completions occurred. Insertion errors on both

(*5) tasks increased to more than half the children in the verbal response task and almost half the children in the picture completion task. Omission errors comprised the next largest category of errors on the picture completion task. The most frequent omission was a "hand" with

---

*=Indication of use of opposition (built into the instructional design) to make comparisons which are in turn reflected in these responses. The number beside the star reflects the way this level of opposition is summarized in Part III.

(*6) the exception of one child who drew only a "hand". That is, most fre-

quently a "man" was drawn without "hands" or a "hat". Two substitution

errors occurred: a "hat" was substituted for a correct completion, and

(*6) a "hand" was substituted for a correct completion. Verbal responses to

(*6) 8:6 contained substitution errors also. For example "a" was used to

replace "his"; "this" for "it"; "hat" for "hand"; and "man" for "hand".

The largest number of verbal responses contained "pointing-naming-charac-

(*1) terizing" structural forms. The other three structural forms were used

in equal proportions.

9:6      This is a hat. It is in his hand.      )
                                                 ) Pointing-Naming Locating
         and                                     )
                                                 ) Structural Forms
10:6     His hat is in his hand. It is his hat.  )

Protocols for these two cards were grouped together since similarities

were indicated in Tables 5 and 6. Also, when separate protocols were

examined more closely it was found that many observations overlapped. No

correct completions for either task on both cards was found. On both

cards, the number of verbal and picture completion responses falling into

(*3) the "no response" ("I don't know") category or the "insertion" category

(*5) exceeded two-thirds of the children studied. The data collected for both

9:6 and 10:6 seemed to indicate that the remaining one-third of the

children drew pictures "guessed" at in a random manner. Usually these

(*6) "guesses" included one to three of the possible combinations of a "man",

a "hat", or a "hand". Most frequently only a man was drawn. For the

remaining one third of the verbal responses scored as errors, omissions

---

*=Indication of use of opposition (built into the instructional design)
 to make comparisons which are in turn reflected in these responses.
 The number beside the star reflects the way this level of opposition is
 summarized in Part III.

and substitutions occurred with about equal frequency.  There was a
failure to acknowledge that these cards contained two sentences bear-
ing a relation to one another.  All the verbal responses for the
(*6)   remaining one-third consisted of one of the following:  "This is a man",
or "This is a hat", or "a hat", or "a hand", "a man" and "a hat".  Sentence
patterns for this third of the group consisted of "naming-only" or
"pointing-naming" structural forms.  Conversely, the children who made
irrelevant insertions most often used "pointing-naming-locating" struc-
(*1)   tural patterns.

## Analysis of Session Seven

Few children were able to identify that a word was missing on each
of the ten presentation cards (Appendix).  Table 7 summarizes the responses
to this part of Session Seven.

Opposition did not function here since there was little overt indi-
cation in these responses (Table 7) to indicate that comparisons between
the pictures of a "man", a "hat" or a "hand" were compared with their
"written" counterparts exhibited in the presentation cards.

Verbal responses made to each of the ten presentation cards in this
session were made more eagerly by the children than in Session Six.
There were fewer long pauses before making a response and fewer children
declined to make a verbal response in this Session.

A summary analysis of errors was computed (Table 8) and protocols for
each card were made following the same format and coded marginal notations
as found in the analysis of Session Six.

---

*=Indication of use of opposition (built into the instructional design)
to make comparisons which are in turn reflected in these responses.
The number beside the star reflects the way this level of opposition
is summarized in Part III.

TABLE 7

SUMMARY OF RESPONSES IDENTIFYING MISSING PICTURABLE
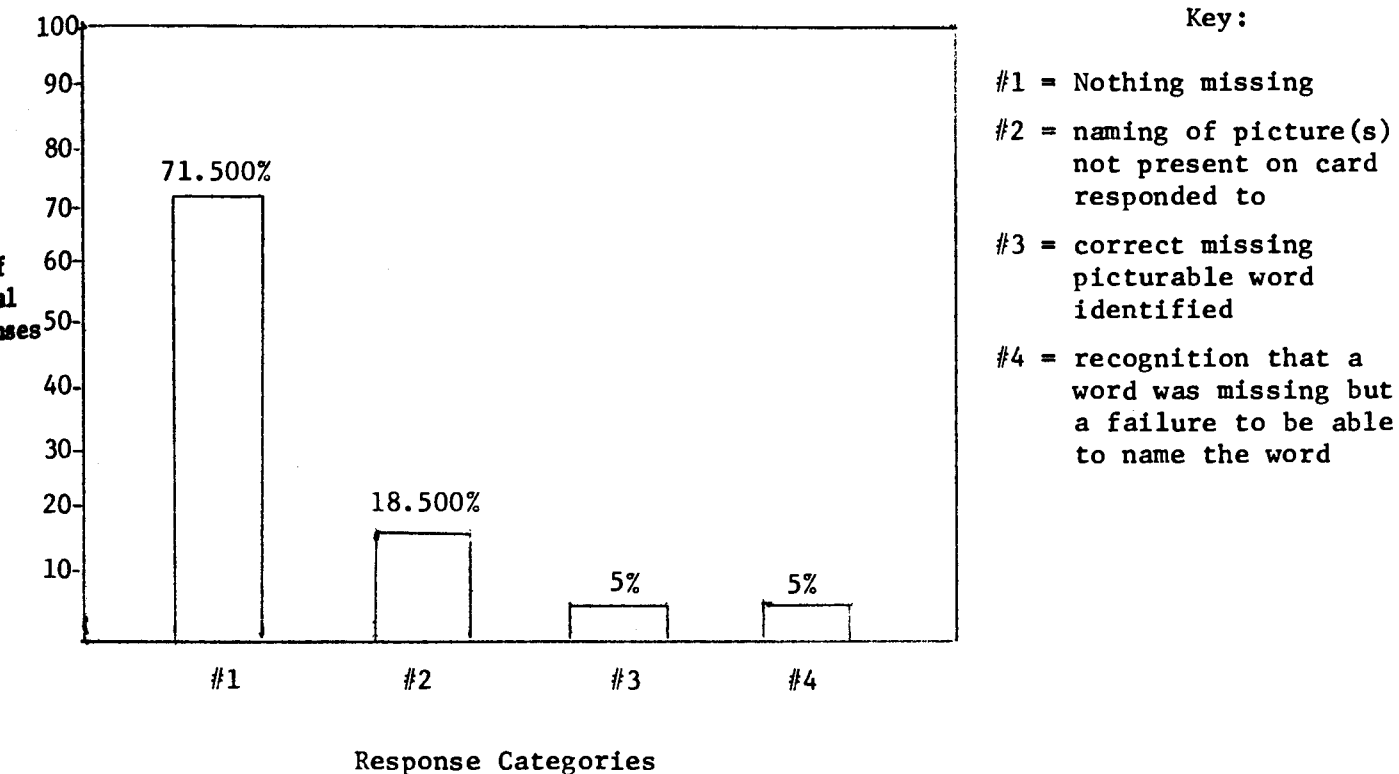WORDS ON TEN PRESENTATION CARDS IN SESSION SEVEN
(N = 200)

Key:

#1 = Nothing missing

#2 = naming of picture(s)
not present on card
responded to

#3 = correct missing
picturable word
identified

#4 = recognition that a
word was missing but
a failure to be able
to name the word

71.500%

18.500%

5%

5%

#1    #2    #3    #4

Response Categories

TABLE 8

SUMMARY OF THE FREQUENCY OF ERRORS TO THE VERBAL
RESPONSE TASK IN SESSION SEVEN (N = 20)

| Card No. | Correct completion | No response | Omission error | Substitution error | Repetition error | Insertion error |
|---|---|---|---|---|---|---|
| 1 | 11 | 0 | 3 | 8 | 0 | 3 |
| 2 | 12 | 0 | 3 | 16 | 0 | 0 |
| 3 | 1 | 0 | 5 | 14 | 0 | 0 |
| 4 | 4 | 0 | 6 | 10 | 0 | 1 |
| 5 | 5 | 1 | 5 | 7 | 3 | 0 |
| 6 | 5 | 0 | 9 | 9 | 1 | 1 |
| 7 | 0 | 1 | 9 | 14 | 4 | 2 |
| 8 | 0 | 2 | 3 | 10 | 2 | 3 |
| 9 | 1 | 1 | 7 | 11 | 0 | 1 |
| 10 | 1 | 2 | 6 | 6 | 3 | 2 |

<u>Protocols</u> <u>for</u> <u>Session</u> <u>Seven</u>  (parentheses indicate word omitted)

1:7     This is a (man.)  (Pointing-Naming Structural Form)

(*4) One child recognized that the picturable word "man" was deleted; five

(*6) children named the picture of the "hat" as missing; two children named

(*5) the man's face as missing; and the remainder of the group declared

(*4) nothing was missing.  Despite these responses, ten of the children were

able to "read" the card correctly.  Omissions consisted of naming the

picture - "a man".  Substitutions occurred.  "Here" or "Its" or "That"

(*6) were substituted for "this".  "Hat" was substituted for "man".  Inser-

(*5) tions took the form of additions added on to the utterance "This is a

man" such as "This is a man standing straight", or "This is a man

walking around".  All four structural patterns occurred in error responses

but "naming-only" occurred most frequently.

2:7     This is a (hat).  (Pointing-Naming Structural Form)

Card Five followed a similar pattern as that described for 1:7.  Again

(*4) only one child identified the correct word missing (the same child as in

(*4) 1:7); one other child discovered "a word" was missing but did not know

what it was.  Five of the remaining children named various pictures

(*6) contained within the other ten cards as missing (such as "a hand", "a man",

"the person".  The remainder of the children asserted "nothing was miss-

(*4) ing".   Eleven children were able to "read" this card correctly.  Among

those responses scored as errors, substitutions occurred most frequently.

"Here", "Its" and "That" were used to replace "This".  No other kinds of

substitution errors occurred. No insertion errors appeared.  The children

---

*=Indication of use of opposition (built into the instructional design)
   to make comparisons which are in turn reflected in these responses.
   The number beside the star reflects the way this level of opposition
   is summarized in Part III.

were constrained by the format they had experienced during Sessions
Two through Five. Omission errors occurred as a result of the children
"naming-only" what they saw in the picture. Three quarters of the

(*1) children used the structural form of "pointing-naming".

3:7      This is a man. This is his (hat). (Pointing-Naming Characterizing
     Structural Form)

Those children who had not discovered any components missing continued
on in this pattern. The number of children who stated that a picture
was missing dropped to one, possibly because all the picture components
within the ten cards were shown on this card. The same two children
(as in 1:7 and 2:7) asserted that "a word" and the "word hat" were

(*4) missing. The number of correct verbal completions dropped to one.
Errors most dominant consisted of substitution of words or whole phrases

(*6) describing the picture on this card. Substitution utterances from
other cards occurred. For example: "His hat is in his hand". Other
substitutions were descriptions of the picture seen. For example:
"This is a man. He is holding his hat" or "This is a man holding his
hat". Also, "he", "here", "that", and "It" were substituted for "This".
Omissions were of two kinds: either that of naming the components of
the picture only ("a man", "a hat") or getting the first sentence correct.
("This is a man") and omitting any further utterance. All the children
made a verbal response to this card. Over three quarters of these
responses contained "pointing-naming locating", "Pointing-naming-charac-

(*1) terizing and "pointing naming" structural forms in equal proportions.

---

*= Indication of use of opposition (built into the instructional design)
to make comparisons which are in turn reflected in these responses.
The number beside the star reflects the way this level of opposition
is summarized in Part III.

4:7      This is a man. This is a (hand). (Pointing-Naming Structural Form)

(*6) The children used the same patterns of responding established in the
three cards above in regard to the query about what was missing. The

(*4) two individuals, who had discovered a word was missing provided the
only exceptions. All the children made a verbal response. Four of

(*4) these proved to be correct. Omission errors adopted the same two forms
as for 3:7. Substitutions again formed the largest category of errors.
They too showed the same forms as 3:7 with one exception. "His" was

(*6) substituted for "a".. That is, 4:7 was "read" as "This is a man. This
is his hand". It appeared that, as in Session Six, 3:7 and 4:7 were
frequently confused. Verbal utterances cast in "pointing-naming-
characterizing" structural forms claimed the largest number of responses.

(*1) "Pointing-Naming" structural forms claimed one-third of the number of
verbal responses.

5:7      This is a (man). This is his hand. (Pointing-Naming Characterizing
Structural Form)

(*4,6) As for the previous two cards (3:7 and 4:7) the same patterns of respond-
ing were observed with regard to the question asking the children to
identify what was missing. Five children were able to give a correct

(*4) verbal response. One child declined to give a response. This child did

(*3) acknowledge that he "couldn't read the words" after a long hesitation.

(*2) Three children repeated the response they had given to 4:7. Omission

(*6) and substitution errors occurred with higher frequency but no new kinds
of errors within these categories appeared other than those established

---

*=Indication of use of opposition (built into the instructional design)
to make comparisons which are in turn reflected in these responses.
The number beside the star reflects the way this level of opposition
is summarized in Part III.

in 3:7 and 4:7.  Several changes in the structural forms the verbal

(*1) responses took were observed.  "Pointing-Naming-Characterizing" claimed

two thirds of all the verbal responses.  "Naming-only" appeared in only

two instances, as did "pointing-naming" also.

6:7       This is a (hat) and this is a hand.  (Pointing-Naming Structural form)

The same patterns of responding observed in 3:7, 4:7, and 5:7 were repeated

with this card in regard to the question asking the children to identify

(*4,6) what was missing.  The word "and" became the most frequent omission.

Substitution errors consisted of "hat" and "hand" being frequently con-

(*6) fused and interchanged.  Only one child deviated from making his verbal

(*5) response tell about the pictures he saw to record, "a man's missing",

a response he continued for the remaining four presentation cards.

Structural forms of verbal responses were examined.  "Naming-only"

appeared in two instances.  Over half the children responded in the same

(*1) structural form as this card.  Errors occurred, either because "and"

was omitted or "hat" and "hand" were interchanged.  The remainder of the

verbal responses contained "pointing-naming-characterizing" structural

forms.  One instance of "pointing-naming locating" occurred.

7:7       This is his hat and this is his (hand).  (Pointing-Naming-Character-

izing Structural Form)

No correct verbal responses occurred for 7:7.  Four children stated

(*2) this card was identical to 6:7 and recorded the same verbal response

given for that card.  Two children left the bounds of the task altogether

and gave imaginative verbal responses ("a cupboard" and "He is getting

---

*=Indication of use of opposition (built into the instructional design)
to make comparisons which are in turn reflected in these responses.
The number beside the star reflects the way this level of opposition
is summarized in Part III.

into his car".) Over half the children omitted either the word "and" or "his" or both these words. Otherwise these responses were correct. Many, in this group, also reversed "hand" and "hat" substituting one

(*6) for the other. With the exception of three children, the word "his" was omitted altogether. Hence, three-quarters of the children confined their verbal responses to a "pointing-naming" structural form. The

(*4,6) same patterns of responding observed in 3:7, 4:7, 5:7, and 6:7 were repeated with this card in regard to the question asking the children to identify what was missing.

8:7     It is his (hand). (Pointing-Naming-Characterizing Structural Form)

(*4,6) The same pattern of responding observed in 3:7, 4:7, 5:7, 6:7 and 7:7 were repeated with this card in regard to the question asking the children to identify what was missing. 8:7 did not elicit any correct

(*3) verbal responses. Two children gave an "I don't know" response. None of the children repeated any response they had given to a previous card.

(*6) None of the children read the word "It" but substituted "this" instead.

(*6) One child used the word "his" - "This is his hand". All other responses

(*6) took the form of "This is a man" or "This is a man and a hand" or "This is a man. This is a hand." Two instances of "naming-only" occurred

(*5) ..."a car" and "a man and a hand". The structural form characterized by "pointing-naming" was the form most often enacted.

9:7     This is a hat. It is in his (hand) (Pointing-Naming-Locating Structural Form)

The same pattern of responses observed in the previous five cards was

*=Indication of use of opposition (built into the instructional design) to make comparisons which are in turn reflected in these responses. The number beside the star reflects the way this level of opposition is summarized in Part III.

repeated with 9:7 in regard to the question asking the children to

(*4) identify what was missing. Verbal responses resulted in one correct

(*5) completion. One insertion response occurred. Five children repeated

the verbal response they had given for an earlier card. For example:

(*6) "This is a man. This is a hat"; "This is a man. This is his hat" or

"This is a man. This is a hand". All the remaining responses were

an attempt to describe the pictures seen on this card. Examples of

these verbal responses include: "This is a man holding a hat"; or

"This is a man and he has a hat"; or "This man has a hat in his hand.

There is another hat". The utterance "This is a man" appeared in nearly

(*6) every error utterance. Little resemblance to the actual verbal utter-

(*4) ance for this card was found. Only two children started with "This is

a hat", other than the child who made a correct response. Three of the

four structural forms for utterance patterns were observed. "Naming-

only" did not occur. Half of the children who made error responses used

(*1) the same structural form used in this card. "Pointing-Naming"structural

forms were used by about one-quarter of the children and the remainder

of the responses contained pointing-naming characterizing structural

forms.

10:7     His (hat) is in his hand. It is his hat. (Pointing-Naming-Locating
         Structural Form)

(*4) One child "read" this card correctly. This was the same individual who

did so for 9:7. This card (10:7) seemed to baffle most of the children,

who responded in a manner similar to that of 9:7. That is, most of these

children described the pictures they saw. Their description, or verbal

---

*=Indication of use of opposition (built into the instructional design)
 to make comparisons which are in turn reflected in these responses.
 The number beside the star reflects the way this level of opposition
 is summarized in Part III.

(*6)   response, consisted of bits and pieces assembled from the other nine

cards with some imaginative elaborations attached. "This is a man.

This is a hat" occurred twice. Other examples of these responses were:

"This man carrying his hat .   This man is showing his hat". or "This

is a man. He has a hat".

(*2)     Three children resorted to a response consisting of a repetition of

(*3) what was said for 9:7. Two children gave an "I don't know" response.

It did not seem relevant to report either omissions or substitutions

for 9:7 and 10:7 since the responses termed errors deviated so greatly

from the presentation cards. The largest number of error responses

(*1) used a "pointing-naming-locating" structural form. Error responses of

the "pointing-naming" and "pointing-naming characterizing" type occurred

in equal numbers among the remaining responses. One instance of "naming-

only" appeared. The same pattern of responding observed in the previous

eight cards was again repeated for 10:7 in regard to the question asking

(*4,6) the children to identify what was missing.

### Part III:  Summary of Detailed Analysis of Protocols: Relation of these Results to Global Analysis

Results from Sessions Six and Seven are summarized in this section

with specific reference to the kinds of opposition observed as operative

during these sessions. The results of this detailed summary are then

related to the global analysis reported in Part I.

In the tasks set for Sessions Six and Seven,six levels were identified

at which opposition worked through the means of comparing, to facilitate

---

*=Indication of use of opposition (built into the instructional design)
 to make comparisons which are in turn reflected in these responses.
 The number beside the star reflects the way this level of opposition
 is summarized in Part III.

comprehending of the instructional design presented to the children. These levels were identified in terms of operational strategies of behavior. Throughout the protocols these instances of opposition were designated by a star (*) appearing in the left hand margin beside the reporting of the corresponding behavior. The number beside the star (for example *1) indicates the level of opposition as it relates to the discussion in this section.

The experimenter felt that the most significant of the six levels identified was the level (*1) in which the "following of structural patterns" characteristic of a specific card occurred in making a verbal response to that card. (For example: see protocols 1:6*1 or 2:6*1 or 3:6*1 or 1:7*1 or 2:7*1) Some of the structural forms following the structural form of the pertinent card, contained what was termed irrelevant content. (For example: 9:6 and 10:6*1) That is, the content bore little or no relation to the task or words on the card per se. Others, who adopted the "correct" structural form for a particular card did so through a re-combination of content abstracted from other cards. (For example: 2:7*1 or 4:7*1) This move from the general to the specific also occurred in the Global Analysis (). The children, on all verbal responses, tended to adopt the kinds of utterance patterns contained within the ten presentation cards. These cards, in effect, called the child's attention to the kinds of language he used. This was evident in the ways he attempted to re-pattern his language when he made a verbal response to the tasks of Sessions Six, Seven and Eight. "Naming-only" did not appear in the ten presentation cards and almost disappeared as a verbal response at these sessions. (For example see: Table 3 or end of 3:6 or 5:7)

The second level (*2) at which opposition served to facilitate compar-

66

ing was identified by the behavior, of "repeating" a verbal utterance
given for the card immediately preceding. (For example: 4:6(*2) or
5:6(*2) or 5:7(*2) or 10:7(*2) )  Comparing in these instances seemed
to negate contrasts and emphasize similarities.  This appeared most
frequently when the pictures (Session Seven) were similar, or when the
word patterns were similar (Session Six). (For example see:  4:6(*2)
and 5:6(*2) or 6:7 and 7:7(*2) or 1:7 and 2:7 or 1:6 and 2:6.)

The third level (*3) of comprehending at which oppositional strate-
gies occurred were those marked by an "I don't know" response. (For
example see *3 in protocols 3:6, 5:6, 6:6, 5:7, 8:7, 10:7.) Here, it
is postulated that the child had understood that the words on the card
had specific "meanings" and "forms" which he could not comprehend and
reproduce in his verbal response.  He had, in effect come to compare
these printed symbols he saw with the verbal utterances he heard,
(during Sessions Two to Five) and had grasped the notion that specific
"spokens" leave specific "tracks" or "writtens" on paper.  He knew
that simply telling about what he saw was not enough to be "correct".
Some children also had this insight in the picture completion task
(see 6:6*3).  They had made comparisons between the pictures represented
on the ten cards in Sessions Two through Five and had come to recognize
when they could not respond or "put-in" the appropriate picture.
Opposition in this instance had occurred at a non-verbal level.

Fourthly (*4), the children who were able to make correct completions
to the tasks set in Sessions Six and Seven showed the widest flexibility
in being able to make meaningful comparisons.  They had accomplished
the move from the general or global perception of comprehending to a
refinement and assimilation of specifics in meaningful ways.  They were

able to act upon and assimilate the oppositional structures contained
within the design of the presentation materials (see Ch. 3 p.29) in
such a manner as to correctly comprehend words in printed form. (see
for example: 1:6*4, 2:6*4, 1:7*4, 2:7*4, 10:7*4) The extent of this
comprehension appeared to vary widely. Session Seven shows many
instances of telling about the pictures presented rather than "reading"
words. (see for example: 6:7 and 7:7) It may be, that an utterance
was viewed as a structural whole rather than as a structural whole
composed of meaningfully linked parts. (that is, words). Hence only
two children were able to determine that one link in the utterance unit
was missing. (see for example: *4 at beginning of 1:7, 2:7, 3:7)

Insertion of irrelevant responses (that is responses that bore no
apparent relation to the experimental materials) formed a fifth level
(*5) at which it is postulated opposition functioned in the making of
comparings. Comparings classified in this pattern of responding showed,
perhaps, the least understanding on the part of the learner about the
nature and purpose of the instructional materials presented to him .
Few patterns could be established by the experimenter at this level.
Opposition functioned here, only, at the level of enabling the child to
make comparisons of the picturable components on the ten presentation
cards and picturable things or objects he knew within his own experiential
world. Hence he inserted these things when he was asked to respond in
Sessions Six and Seven. In Session Six, insertions of this type were
largely examples of the simplest level of knowing: that of "naming only".
(see 2:6*5 or 3:6*5 or 1:7*5) "Reading" for these children consisted of
"talking about" pictures. (For examples see: 9:6 and 10:6 or 3:7 last
half of protocol, or 9:7 or 10:7) However, the majority of these chil-

dren did comprehend something of the structural forms present in the various presentation cards. They reflected this comprehending in the manner in which they adhered to the appropriate structural form despite the insertion of irrelevant content. (For examples see: 3:6*1 or 9:7*1 or 10:7*1) Only a few children never progressed beyond "naming-only". (For examples see:2:6*5 or 3:6*5 or 1:7 end of protocol)

Lastly, substitutions formed the sixth level(*6) at which opposition served to make comparisons possible. Here the child had made a kind of global comparison between the experimental materials and the world he knew. When he was presented with the tasks of Sessions Six and Seven (which required the making of specific comparisons in order to make a correct response) he recognized that the limits of appropriate responses to these tasks fell within the materials he had seen in Sessions Two through Five. Thus, when he could not comprehend the words per se, he substituted some other picture, word, or whole utterance from some other card. In the picture completion task, this response included one of the three possible variations of man, hat, and hand as they were represented on the ten cards (for examples see:*6 in 4:6, 6:6, 7:6) when the chil-dren were asked "what was missing?" (Session Seven), they often responded by naming the picture missing. (For examples see *6 in 1:7, 2:7, 3:7) Verbal responses to both these tasks (Sessions Six and Seven) showed this level of opposition exhibited in behavioral responses.( See for example: *6 in 8:6, 9:6, 10:6, 1:7 or 10:7.)

## Conclusion

The major finding in the global analysis was indicated as a move from a general to a more specific kind of comparison and categorization. (See Summary, Part I) Analysis of the Protocols for Sessions Six and

Seven also indicated this type of move and yielded information about how some of the specific kinds of comparisons and categorizations take place and how they are in turn reflected in overt responses. Six levels at which opposition functioned in the facilitation of comparisons were identified and discussed in this summary. These levels are qualitative assessments and they are not arranged in order, nor is any power function of levels indicated clearly by the results of this study.

The results of the investigation lend definite and specific support to the notion that opposition serves a catalytic role in cognitive processes related to the comprehending of instructional designs. Indications that much of this comparison process in young children is made at the non-verbal level is supported by the kinds of opposition observed as operative in the protocols discussed above. The move from the "general" to the "specific" appears first at this non-verbal level (see *1 in protocols) and seems to be an attempt to perceive "patterns in" and the "global structure of" the task the child attends to.

Further discussion of these outcomes and some of their implications for the two main areas of concern delineated within the scope of this thesis are continued in Chapter Five.

CHAPTER V

DISCUSSION OF OUTCOMES


"No general theory can be arrived at save as materials
separated for special study are rejoined".   (John Dewey)


Introductory Remarks


This study is an attempt to explore the role of opposition in

cognitive processes.  It is postulated that opposition acts to serve

a catalytic role in the making of comparisons, thus in turn acting as

a vehicle through which meaning (that is, comprehending of printed

symbols in contexts) becomes possible.  Specifically, opposition occurs

within transactions among homogeneous continua.  Oppositions are resolved

through transactions of knowing and known jointly.  Relations involved

in perceiving oppositions, in this view, are not detachable or cannot

exist separately from the elements they represent.  Qualities relevant

to these relations may be separated for special study, but emphasis is

placed on the knowledge that this separation is an abstraction used to

secure temporary descriptions, which must then be related to the system

as a whole if researchers are to obtain a comprehensive and meaningful

report of behavior.

Techniques used in this thesis are an attempt to elicit overt

responses such that the role of opposition in the making of these re-

sponses could be observed and related to two areas of concern:  that

of child growth and development and that of instructional design.  It

was postulated that opposition would provide an ordering focus for

young children as they engaged in comparings involved in comprehending

instructional designs.  The design was selected in an attempt to study

three specific areas to determine the ways opposition served to render comparisons possible and meaningful. These three areas included: first, an attempt to study the kinds of comparisons a highly specific instructional design invites in young children; second, how children record these comparings; and third, how children relate these comparings to their own "experiential worlds".

The first part of this chapter focuses on a discussion of the procedures used and the outcomes of the use of these procedures in regard to the attainment of further understanding of the role of opposition in the making of comparisons (which in turn relates to knowledge about cognitive processes). The latter part of the chapter contains a discussion of outcomes with a focus on the relation between these outcomes and implications for instructional design in education.

## Child Growth and Development

### Opposition: Mainspring for Comparison

Opposition was studied as it functions within a controlled environment. Opposition serves to provide structure in comprehending. This view was two-fold in nature. It was an attempt to determine how opposition, acting in cognitive structure, affects, determines and directs actions and behavioral transactions. It was also an attempt to ascertain how opposition, acting in this role, provides for the creation, maintenance and re-creation of cognitive structures.

The instructional design presented by means of the ten presentation cards in this study did invite the children to make several kinds of comparisons.

There was evidence to suggest that the children focused on

comparisons of the ways in which their own speech was ordered

and that speech order recorded on the ten cards. (Chapter IV,

Part III)

There were instances of children responding to the task of giving a

verbal utterance to each presentation card with an utterance that

followed the same structural form as that of the presentation card.

(For example: Card One - "This is a man". Responses were: "This is

a hat". "This is a hand". "This is a house".) This type of structural

patterning appeared most evident in the verbal utterances given to the

Draw-a-Classroom Test. When the children were asked to tell about their

pictures during the first meeting, almost all the utterances given were

instances of "naming-only". On the second meeting the majority of the

utterances changed to "pointing-naming" structural forms. The children

had, in effect, taken note of the kinds of uses this structural pattern

performed in telling about their own experiences.

The children seemed to favor the use of "pointing-naming"

and "pointing-naming-characterizing" structural forms.

This may have occurred because eight of the ten presentation cards fell

within this category. It may also have been a reflection of the level of

maturity these children had attained in their speech. Few "pointing-

naming-locating" structural forms were used. Only two presentation cards

(9 and 10) were in this category.

The Goodenough-Harris Drawing Test revealed that other

kinds of comparisons were made by these children.

The standard scores that showed significant increases were a result of the

addition of five items that could be directly related to the material on

the ten presentation cards. The children who showed these increased scores

could have observed and taken note of such things in the drawings on the ten presentation cards. For example: the addition of fingers to a hand, proportion of arms and legs, proportion of the shoulders, and addition of clothing (most often a hat).

Evidence to support the hypothesis that the kinds of opposition controlled and presented in the ten cards resulted in this behavior was also found in the five children whose Goodenough-Harris Standard Scores did not increase significantly.

The majority of these children had taken note of most of these features and recorded them in their first drawing of a man. (Chapter IV, Part I) Hence, the comparisons invited in the experimental materials probably served to reinforce this knowledge.

Mott (reported by Harris, 1963, p.93) confirmed that drawings made after children had engaged in rhythmic games emphasizing certain body parts verbally and in body motion resulted in increased scores on the parts emphasized. Harris (1963, p.93) also investigated the effect on children's Goodenough-Harris drawings, of rhythmic exercises not emphasized verbally. His evidence suggested that motor and kinesthetic experiences are not projected into drawings. That is, Harris found that a fifteen minute time lag was insufficient to produce any carry-over effect.

The findings of these researchers would appear to lend support to the hypothesis that the kinds of controls of opposition within the ten presentation cards served to make meaningful comparisons possible for some children.

The comparisons they made were, in turn, reflected in the kinds of features included in their drawings of a man. The ways the children recorded the comparings made and related these comparings to their own "worlds" offered

intriguing grounds for observation and exploration. At this formative

and initial stage of learning, "reading", for most of the children

observed meant "using speech to tell about pictures". "Printed symbols

in Contexts" were meaningful to the child only in this way and hence the

comparings a child made were in terms of what he heard and then in turn

compared to the picture on the card he saw. Thus many instances of errors

in verbal responses in Sessions Six and Seven occurred as a result of a

failure, on the part of the child, to take note of the printed words on

the card. Opposition may have acted to reinforce this behavior. That

is, verbal utterances telling about the pictures the child saw fed -

forward to produce the children's use of verbal utterances specifically

telling about the pictures they drew in Session Six or the pictures they

saw in Session Seven.

Errors, too, reflected many ways in which the children recorded and

related the comparisons they made.

Many instances of errors indicated that the children had per-

ceived something of the structural forms of the utterances

within the ten presentation cards and had then patterned their

verbal responses in a similar fashion.

Also, if the structural form and the visual pattern formed by the words on

any given card tended to be very similar to another, it was often mis-

taken for the other. (For example: Card Six: "This is a hat and this is

a hand" was mistaken for Card Seven: "This is his hat and this is his

hand". or Card Three: "This is a man. This is his hat". was mistaken

for Card Four: "This is a man. This is a hand".)

Many similarities were found between the kinds of errors

Margaret Donaldson (1963) found in her study of children solving

problems and the kinds of errors committed in the study reported here.

Donaldson (1963) set children to solving problems while thinking aloud. Each type of problem Donaldson used was first analyzed according to the nature of the problem and then variables involved in the process of achieving a correct end result were identified. Through this procedure she was able to determine three general categories of error: (1) arbitrary, (2) structural, (3) executive. An error in Donaldson's study was defined as an error in process, not a mistaken end result.

This study differed from Donaldson's in that it was an attempt at observing the role opposition played in the making of comparisons. Donaldson's study attempted to identify and compare the kinds of process going on when individuals are solving problems. The current study was more concerned with the role opposition played in the problem solving process.

Both studies show similarities in the kinds of errors the children made. Children in both studies committed what Donaldson termed arbitrary errors. These consisted of a failure of the child to be constrained by the conditions the problem set for him. Donaldson found that the less the problem presented refers to 'real' life situations, people, or events (Donaldson, 1963, p.202) the less there is encouragement to deviate from the problem as given. In the current study, arbitrary errors occurred most frequently in Session Six (Put-in-the Pictures). Here the child often failed to be confined to the conditions of the task as given. He included many pictures from his own experiential background. However, he did not commit arbitrary errors to any comparable degree when he made a verbal response to cards during this session. Here he did appear to be confined

to the structural forms inherent within the instructional design. He

indicated that he had taken note of them in the ways he ordered his

speech in his responses. Arbitrary errors appeared much diminished in

Session Seven. The children appeared to be confined to the task as given.

That is, they did not deviate from the content within the ten presenta-

tion cards. However, they did pay attention to the pictures on the cards;

in some cases almost to the exclusion of other kinds of information.

The children focused on telling about the picture, ignoring the words on

the card. They also focused on structural forms, ignoring the content

of the structural form, except in as far as to make it adhere to or be

consistent with the picture seen.

Structural errors also had analogues in this study. Donaldson states

that these kinds of errors arise as a result of a failure to appreciate

the relationships involved in the problem or a failure to grasp some

principles essential to the solution. In this study, some of the children

failed to grasp the principles of control of oppositions (included in the

utterances printed on the ten cards) in order to comprehend printed

symbols. They could not utilize these controls in realizing what the

printed symbols said. For example: Only two individuals showed indica-

tion of this kind of understanding in Session Seven and therefore were

able to identify the missing part of the printed code, essential to the

meaning of the utterance on each card.

Executive errors resulted when children perseverated a response for

all cards bearing similar appearances. (Chapter Four, Part III) There

were occasions when a child drew the same picture for all the cards in

Session Five. Most often this was a drawing of a man. Similarly,

occasions occurred when a child carried the structural form of Card One

(This is a man.) throughout the ten cards but inserted objects from his own experience as content. (For example: "This is a ball." "This is a T.V.".) Only a small portion of the oppositional structures included within the ten cards were fully comprehended. Hence, only a fragmented response indicating knowledge of some of these structures was possible.

This study appears to confirm what Faris (1968 p.60) noted when assessing the instances of structural errors in his study of student teachers comprehending instructional design. Faris found that product measurement was not very helpful in assessing the degree to which persons are able to grasp the implications of instructional design. He found that an assessment of what and how persons tackled problems as they were engaged in doing problems gave a better under- standing of process. Conversely, product measurement yielded an indication only of grasp of parts of the problem.

Specifically, the children observed in the current study committed a large number of errors. Product measurement in terms of the number of correct responses gave little information about process or of how comparisons entered into cognitive process. Analysis of structural forms occurring in verbal responses, examination of what children put into their drawings, and observation of the ways children related the experimental materials to the Goodenough-Harris Drawing Test and the Draw-a-Classroom Test did give a better indication of the kinds of comparisons the children entered into, and, in turn, how these comparisons were recorded.

Both Donaldson (1963) and Faris (1968) draw attention to the notion that the structure of a problem increases in complex- ity in direct proportion to the necessity for going beyond an

analysis of errors in order to understand the problem

solving process. This study confirms this assertion.

The kinds of comparisons the children made were revealed through a look

at behavioral strategies and modes of searching adopted by the children

studied. These patterns, in turn, were used by the researcher as

"speculative instruments" as to the role opposition assumed in the com-

parisons made by these children. It appeared that much could be gained

through careful observation of how a child comes to order his speech and

use it to record and report on his experiences.

Control of language patterns in the experimental

materials seemed to provide important guidelines for a child

coming to comprehend written speech patterns, thus being able

to use and compare them with other patterns.

The study undertaken here seemed to lend support to the use of these kinds

of controls acting through the instrument of opposition to facilitate

comprehending.

Time was indicated as an important factor. The short

time of three weeks in which behavior was observed in this study, showed

indications of opposition operating in cognitive processes. It appears

that similar observations over longer periods of time are now indicated

for further confirmation of these findings.

Instructional Design

Opposition: Implications for Instructional Design

"All clinical procedures can do is provide clues for an
imaginative thinker to utilize". (Donaldson, 1963, p.34)

This study was not an attempt to predict when opposition, used as a

guiding principle in the ordering of instructional materials, "works" for

any given purpose. Rather, it was, an attempt to determine some of the ways in which opposition "works" as a tool in cognitive processes. Thus, the responses to the tasks set were examined to determine how the controls of opposition used in the instructional design were "taken note of" by the children, and what the comparisons made by these children had in common.

Briefly, this study found that some of the controls used in the experimental materials, specifically designed with the principles of opposition in view, were perceived by the children. It was hypothesized that, given a longer time, the children would have made further compar- isons inherent within  the structure of the presentation cards. The children did perceive language pattern controls in the presentation cards and showed many instances of attempting to order their own speech in similar patterns. They did make comparisons of the various structural forms they were presented with and the structural forms they used in their own speech patterns.

There is some evidence to suggest that the Language Master method of presenting reading materials to children has merit.

Some children tended to repeat what they heard, guess at what they were going to hear, and verbalize along with the "voice" they heard. Gagné and Smith (1962) found that requiring subjects to verbalize while engaged in doing problems was a condition significantly related to superior performance in solving problems. They also asserted that verbal- izing was the most important factor at work in producing a greater number of individuals who can state fully adequate verbal principles involved in the task solution.

Piaget (1955, p.162) too, supports the importance of verbalization in the effective development of cognitive processes when he discusses syncretism existing in the thought and language of preschool children. In using the "syncretistic method" in handling meanings, a child lets all the difficult words in an utterance slip by; he then connects familiar words into a general schema, which feeds-forward to enable him to interpret the words not initially understood. Piaget acknowledges that this method gives rise to considerable errors on the part of the child; but believes it to be the most economical method in the long run, because it gradually leads the child to an accurate understanding of things by the gradual process of "selection and approximation."

Luria (article by Joynt and Cambourne, 1968) maintains that one of the roles of speech in human development is to regulate behavior and that in the course of development this function passes through certain sequential stages that may be identified. His position also lends support to the notion of maintaining and innovating instructional designs which adhere to speech patterns the child in an overt manner, can compare and contrast with his own speech patterns. This in turn enables him to regulate and re-direct his behavior in meaningful ways. Piaget (1955) too, emphasizes the vital role of speech in performing an orienting, organizing, and regulating function in overt behavior. Stones & Heslop (1968) found that verbal ability more than other measures, was closely associated with conceptual thinking. That is, the way a child orders his speech reflects the sophistication of order in his cognitive processes.

Therefore, simultaneous presentation of visual and aural stimuli, in instructional design appears to be useful.

Further, within the presentation of these stimuli controls must be observed such that the child can compare and contrast what he hears and sees with what he "knows". Opposition, used to provide an ordering focus for the presentation of these stimuli, is indicated as an important control in design.

"Information overload" appears to be another important control. It is hypothesized that the amount of information contained within the ten presentation cards was "too much" in the context of the study undertaken. Thus the children selected out certain comparisons and focused on them. Given a longer time span, they no doubt would have "moved on" to enter into further comparisons of the ways in which meaning comes about. Donaldson (1963, p.212) points to the definite limits of the "capacity of the human nervous system (a) to take in information in a given brief time interval; (b) to go on taking it in at the same steady level of efficiency over longer time intervals; (c) to retain it briefly while at the same time manipulating it in various ways in order to produce the solution to a problem." She also emphasizes how little is known about how capacity at any one of these levels relates to capacity at the others.

The present study offered some support for the use of principles of opposition in instructional design as an important variable in the meaningful control of information overload.

Astute observation of learners actively engaged in learning processes is now indicated if further principles regulating the controls important to instruction design are to be ascertained. The importance of the sort of invitation issued to learners in order to bring about growth cannot be over emphasized.

MacKinnon (1959) used Richards-Gibson materials to study children learning to read. He found that these materials were particularly effective when used in small groups with minimal teacher instruction, but were less effective with individuals. This thesis also used these beginning reading materials to work with individuals. Since the Language-Master Machine, used to present the materials in this study, appears to require an individual work relation to learners, no indication of how individuals work together to discover how opposition enters into meaning was possible.

The current study indicates that a study of how controls of opposition designed in the presentation materials works to initiate comparisons, in a group situation, could prove profitable.

Harold Innis' (1951) concept of "interface" seems relevant here. "Interface" as a research technique, does not consist of working from a "perspective" or "point of view". Rather, it involves examination of the interplay of the "multiple aspects of any matter". It is not a "looking at" but a sudden awareness of the "meeting point" of many complex processes of interaction. MacKinnon (1959, p.228) finds evidence of how instructional design relates here when he postulates: "The success of the children who worked with the Richards-Gibson materials suggested that such a task did not impose an order but elicited one - an order inherent in the children".

"Interface", used as a technique in research about instructional designs, requires that experience, in a sense, must always be viewed as a subjective, holistic thing within which levels may be discriminated according to the situation that occurs. Crucial to this position is the view that behavior can only be viewed in terms of environmental "situations". "Naming"

enters this examination of "situations" in the following way. Names, as such, are used to call attention to the features of situations and hence become tools for directing experimental observation. (Bentley and Dewey, 1949). "Naming" is a form of behavior which in turn acts as an instrument to other behavioral processes in an ongoing continuum. What is named, acts to differentiate with respect to the environment, while the act of naming serves to differentiate with respect to the organism. Opposition, acting as the mainspring for comparisons, operates as a variable in this process. The split between the "act of naming" and "what is named" is never existential or factual. It is an abstraction. "Naming", therefore, is an act of designation which serves to differentiate organism and environment in terms of kinds or qualities of probable behaviors. Opposition provides a way in which this designation comes about. Some attempt has been made in this study to examine the "meeting-point" or "interface" involved in this designation.

Further exploration under controlled conditions is necessary and better techniques for rendering overt the many complex processes of interactions are vital.

Several guidelines for development in this regard have been utilized and others suggested in this thesis.

Procedures adopted in this study indicate that experimental procedures used do influence the behavior and perhaps the outlook of those exposed to them on other learning tasks.

Therefore the ways in which we measure performance or "achievement" in these tasks is crucial. Often the "testable" features of learning tell us little of the "process" or "growth"that has gone on·. For example: In the measurement of reading skills the easily testable features of compre-

hension have been emphasized. Largely, the result has been a proliferation of individuals highly skilled in the collection and reproduction of "facts" and "opinions" with little ability to reflect and discriminate between them. Raths, Jonas, Rothstein and Wassermann (1967) found that many teachers rely on intuitive assessments of the process of thinking and learning. They emphasized the lack of ability on the part of college educated teachers to provide invitations for and to be able to assess "thinking". This study suggests that control of oppositions is relevant here. Faris (1968) argues that "effective instructional design can facilitate comprehending in that it invites, maintains, and validates. It also suggests that this facilitating operates in conjunction with other conditions of comprehending". The study reported here argues that principles of opposition act as means through which comprehending of instructional designs can be invited, maintained and validated. They contain means by which "how to generalize" comes to be acquired. This, in turn, provides the child with some of the means whereby the power to recognize and meet problems again when they arise in a new form is achieved.

Further study of other factors entering into the process of

"generalization" is indicated.

A study of the role of language in behavior in this sense, becomes both "means" and "end". It is seen as "end" in the sense that it appears as a result of certain kinds of ordering on the part of an individual; and as "means" in the sense of providing structure and direction for further ordering. The importance of this kind of study and its relation to the social group cannot be over emphasized. Man's inner "thoughts" can only be a reflection of his outer lexication with the social group of which he

is an integral part.

In concluding, the following quotation seems particularly relevant in terms of looking at what we should be doing in the future -

> "Let us admit the case of the conservative: if we once
> start thinking no one can guarantee where we shall come out,
> except that many objects, ends and institutions are doomed.
> Every thinker puts some portion of an apparently stable world
> in peril and no one can wholly predict what will emerge in its
> place". (John Dewey, ed. Ratner, 1939)

"Let us admit" to "the case of the conservative" and with that knowledge experiment meaningfully and boldly!

BIBLIOGRAPHY

Bentley, A. F. and John Dewey. Knowing and the Known. Boston: The Beacon Press, 1949

Chall, J. Learning to Read: The Great Debate. New York: McGraw-Hill, 1968.

Dewey, J. "How is Mind to be Known", Journal of Philosophy, Vol. XXXIX, No. 2, January 15, 1942, pp. 29-35.

Dewey, J. Logic: The Theory of Inquiry. New York: Holt, Rinehart and Winston, 1938.

Dewey, J. Philosophy and Criticism. New York: G. P. Putnam's & Sons, 1931.

Donaldson, Margaret. A Study of Children's Thinking. London: Tavistock Pub., 1959.

Eson M. and D. Flinton. The Bethlehem Central School District Language for Learning Project. (U.S. Office of Education Report) Delmar, N. Y., 1964.

Faris, P. W. "A Study of Student Teachers' Comprehending of Instructional Design". Unpublished Master's Thesis, Simon Fraser University, 1968.

Gagné, R. and E. Smith. " A Study of the Effects of Verbalization on Problem Solving". Journal of Experimental Psychology, Vol. 63, 1962, pp. 12-18.

Harris, D. B. Children's Drawings As Measures of Intellectual Maturity. New York: Harcourt, Brace & World, Inc., 1963.

Harris, D. B. Goodenough-Harris Drawing Test. New York, Chicago. Burlingame: Harcourt, Brace & World, Inc., 1963.

Hess, R. D. and R. Bear. Early Education. Chicago: Aldine Pub. Co., 1968.

Innis, Harold. Bias of Communication. Toronto: Univ. of Toronto Press, 1951.

Joynt, Denis and Brian Cambourne. "Psycholinguistic Development And the Control of Behavior". British Journal of Educ. Psych., Vol. 38, Part 3, November, 1968, pp. 249-271.

Luria, A. R. and F. la Yudovich. Speech and the Development of Mental Processes in the Child. London: Staples Press, 1966.

MacGinitie, W. H. "Evaluating Readiness for Learning to Read". Reading Research Quarterly, Vol. IV, 1969, pp. 30-39.

McCullough, C. M., R. Strang and A. E. Traxler. Problems in the Improvement of Reading. New York: McGraw-Hill, 1946.

McHugh, G. "Changes in Goodenough I. Q. at the Public School Kindergarten Level", Journal of Educ. Psych.,Vol.36, 1945, pp. 17-30.

MacKinnon, A. R. How Do Children Learn to Read. Vancouver. Toronto. Montreal: Copp Clarke Pub. Co. Ltd., 1959.

Mead, George. Mind, Self and Society. Chicago: Univ. of Chicago Press, 1934.

Mead, George. Philosophy of the Act. Chicago: Univ. of Chicago Press, 1938.

Ogden, C. K. Basic English: A General Introduction with Rules and Grammar. Psychology Miniature; No. 29, London: Kegan Paul, 1940.

Ogden, C. K. Opposition: A Linguistic and Psychological Analysis. London: Kegan Paul, 1932.

Ogden, C. K. and I. A. Richards. The Meaning of Meaning. London: Routledge and Kegan Paul, 1941.

Piaget, Jean. The Language and Thought of the Child. New York: Meridian Books, Inc., 1955.

Piaget, Jean. Psychology of Intelligence. New Jersey: Little Field, Adams and Co., 1960.

Ratner, Joseph (editor). Intelligence in the Modern World. John Dewey's Philosophy. New York: Random House, 1939.

Richards, I. A. Practical Criticism. London: Routledge and Kegan Paul, 1929.

Richards, I. A. "The Secret of Feed-forward", Saturday Review, Vol. 51, No. 36, Feb. 3, 1968, pp. 14-17.

Richards, I. A. and C. Gibson. Basic English and Its Uses. London: Routledge and Kegan Paul, 1943.

Richards, I. A. and C. Gibson. First Steps in Reading English. New York: Washington Square Press, 1957.

Richards, I. A. and C. Gibson. Interpretation in Teaching. London: Routledge and Kegan Paul, 1949.

Richards, I. A. and C. Gibson. Speculative Instruments. London: Routledge and Kegan Paul, 1955.

Richards, I. A. and C. Gibson. So Much Nearer. New York: Harcourt, Brace and World, Inc., 1968.

Toronto Board of Education. Draw a Classroom Test – Manual and Scoring Categories. Toronto: Toronto Board of Education Research Department, 1966.

Vygotsky, L. S. Thought and Language. New York: J. Wiley and Sons, 1962.

Whorf, B. J. Language, Thought, and Reality. Cambridge, Mass.: M. I. T. Press, 1956.

APPENDIX

The cards shown on the following ten pages illustrate the ten cards presented to each child during Sessions Two through Five. For Session Six, these cards were presented with the pictures deleted and each child was asked to "put in the pictures". During Session Seven, these cards were presented again, but with a word omitted. The child was asked to tell what was missing and then make a verbal response to each card. The star (*) at the bottom of each card indicates the word omitted in Session Seven. (For further details see Chapter Three: Procedures).

# This is a man.

*Session Seven: The word "man" was omitted
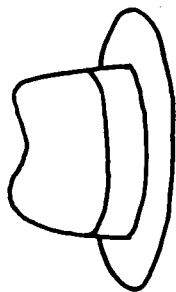
# This is a hat.

*Session Seven: The word "hat" was omitted

# This is a man.

# This is his hat.

*Session Seven:  The word "hat" was omitted
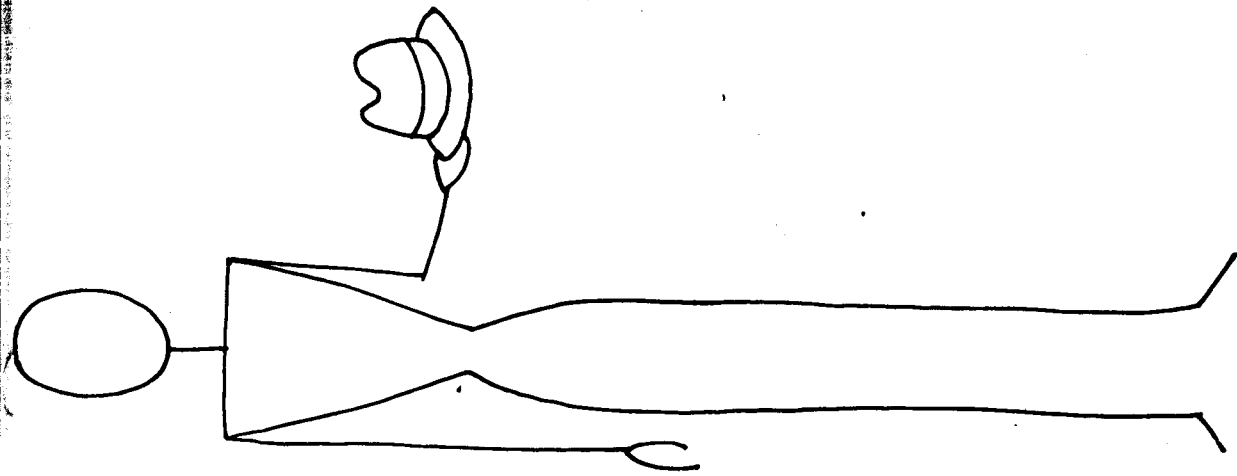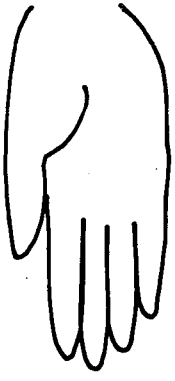
# This is a man.
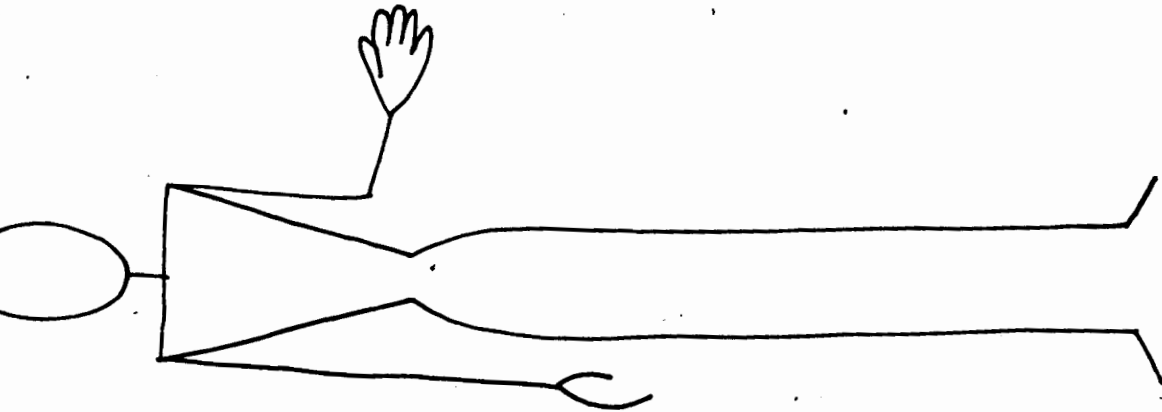
# This is his hand.

*Session Seven: The word "man" was omitted

# This is a man.
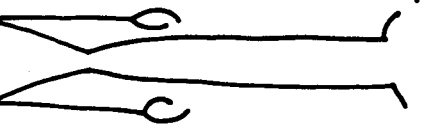
# This is a hand.

*Session Seven: The word "hand" was omitted
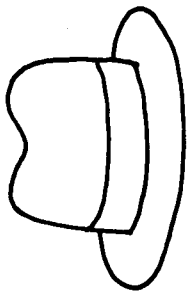
# This is a hat and this is a hand.
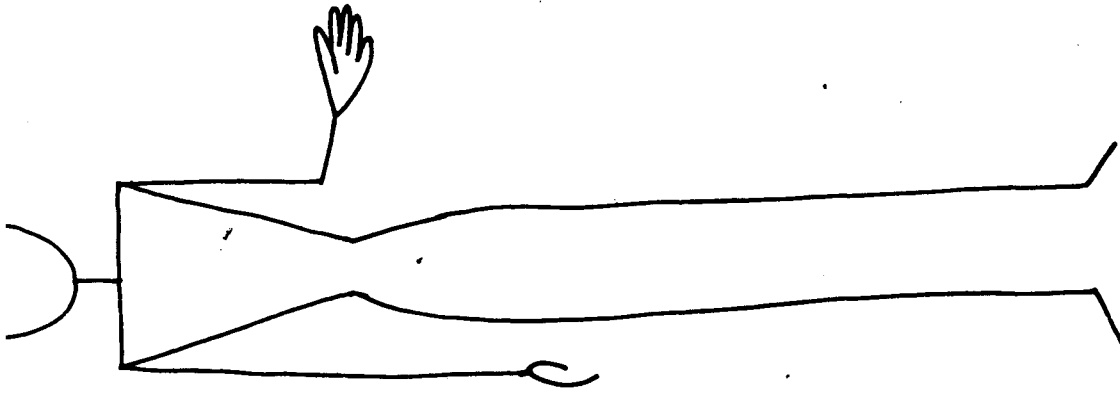
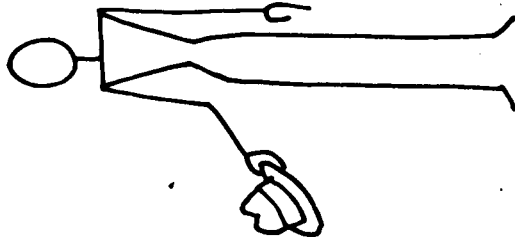*Session Seven:   The word "hat" was omitted
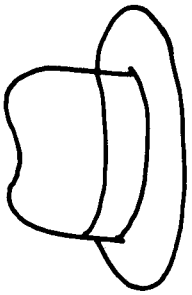
# This is his hat and this is his hand.

*Session Seven: The word "hand" was omitted

# It is his hand.

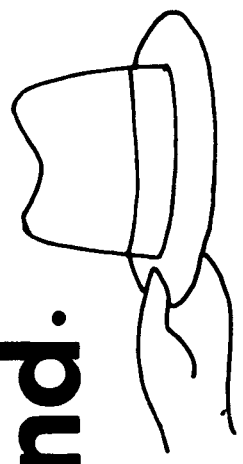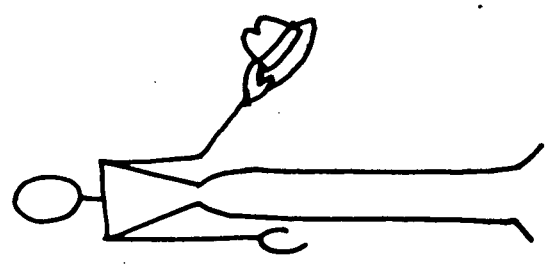*Session Seven: The word "hand" was omitted

# This is a hat.

# It is in his hand.

*Session Seven: The word "hand" was omitted

# His hat is in his hand.

# It is his hat.



*Session Seven: The word "hat" in the first sentence was omitted