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Children's Understanding of Oppositionality: In Support of a Predictional Process

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CHILDREN'S UNDERSTANDING OF OPPOSITIONALITY: IN SUPPORT OF A PREDICATIONAL PROCESS

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CHAPTER I

INTRODUCTION

Throughout the history of psychology, most theories of learning have been based on the assumption that the person is the passive recipient of knowledge. It has been assumed that meaning exists extrinsic to the person, who passively learns about the world. Logical Learning Theory (LLT) offers an alternative theory of learning and knowledge. In contrast to traditional theories, LLT theorizes that the person actively creates meaning, the extension of which is the learning process. Although both theories assume that categories, organized patterns of meaning, are essential to knowledge, they disagree on whether meaning is created by the person or is passively received by the person.

Traditionally, the study of children's categories in developmental psychology has been based on the assumption that children are passive recipients of knowledge. Logical Learning Theory assumes that through the process of predication, children actively engage in the creation and extension of meaning. The process of predication involves the extension of organized patterns of meaning, or categories, to a target. The sentence "ice cream is cold" serves as an example of the predicational process. In the above example, the meaning of "cold" is extended to the target or "ice cream." This is an example of how meaning is extended and learning occurs.

According to Logical Learning Theory, oppositionality is fundamental to the process of predication. Oppositionality is not something which children learn but is

essential to the learning process itself. For example, in order to know that something is "cold," one must implicitly understand the meaning of "hot." The meaning of "cold" is delimited by the meaning of "hot." Therefore, the child categorizes, or predicates, that the ice cream does not belong to the category, or the organized pattern of meaning, of "things that are hot."

The role that oppositionality plays in the development of children's knowledge has received little attention in research to date. Unlike LLT, theories that assume that meaning exists independent of the person assume that oppositionality is simply another meaning which the child must acquire or learn. However, LLT theorizes that oppositionality is intrinsic to the predication process itself and therefore "exists" in order for children to learn. This thesis explores the ability of kindergartners through fifth graders to employ oppositionality in reasoning by administering simple problems to determine whether or not they actually know its precise meaning.

CHAPTER II

REVIEW OF LITERATURE

Mediational Versus Predicational Theories

Historically, theories in psychology have been based on a mediational model. A mediational model assumes that "something that is produced elsewhere and taken in or input comes to play a role in the process that was not initially a part or intrinsic to it" (Rychlak, in press). Mediational models of knowledge assume that meaning exists external to the individual, who passively receives knowledge. Therefore the content, an ingredient employed by the process, plays an important, influential role in mediational theories. The content is that which is input, influencing the psychological processes that occur. An example would be the hypothesis that the shape of an object determines its categorization. In this example the physical shape, or content, which exists external to the person, plays an important part in the process of categorization.

Since objects existing independently of the subject play an important role in the psychological process in mediational models, research based on these theories have focused on the exact nature of the inputs influencing the process under study. In developmental psychology, research on the development of organized patterns of meaning, or categories, is based on a mediational model of human thinking. Therefore, research in developmental psychology has focused on the attempt to discover the attributes, or

features, of objects which influence the process of categorization. An example of this is the study by Ward and Scott (1987) conducted to discover whether the size or the shape of an object is more important in the categorization of the object. The emphasis on the features or attributes of the contents of categories has overshadowed discussion of the process of categorization within developmental psychology.

Logical Learning Theory provides an alternative to theories based on the mediational model. Unlike theories which employ the mediational model, LLT assumes that the person actively creates meaning. Meaning is defined by LLT as "patterned intention" (Rychlak, in press). For example, in the statement "Mary stated that she wants ice cream," an intention or goal is expressed to obtain ice cream which is logically related to the subject, Mary. The ice cream which exists independent of the subject does not determine the meaning of the subject's intention to obtain the ice cream. Therefore, within LLT meaning is not a reality independent of the person (which is input), but the person is the active creator of meaning.

The difference between Logical Learning Theory and theories based on mediational models, is that LLT stresses the fact that the process creates meaning. Process is a "discernable, repeatable course of action on the basis of which some item(s) under description is/are believed to be sequentially patterned" (Rychlak, in press), whereas content is "an ingredient that is produced, conveyed, or otherwise employed by a process" (Rychlak, in press). For example in the statement made by the child "ice cream is cold," the ideas of "ice cream" and "cold" are the contents, and the process is that which relates them. Within mediational models, unlike LLT, the content contains meaning external to

the process, and it is this meaning which influences the process itself. For example, a mediational model might state that the similarity of the shape of the "ice cream" will determine its relationship to "cold" (e.g. whether it is or is not cold). This is an example in which external factors, like shape, influence the process. Alternatively, LLT theorizes that it is the process of relating the objects which determines the meaning of the objects. In other words, it is through the process of "cold" (the predicate) being extended to "ice cream" (the target) that "ice cream" has meaning for the child who engages in the process. According to LLT, meaning is created, organized, and extended via the process of predication.

LLT -- a Predicational Theory

Predication is defined by LLT as a process that involves "the logical act of affirming, denying, or qualifying precedently broader patterns of meaning in sequacious extension to narrower or targeted patterns of meaning. The target is the point, aim, or end (telos) of the meaning-extension" (Rychlak, in press). For example, in the predication "ice cream is cold," the meaning of "cold" is extended to the target ice cream. In this example, the broader pattern of meaning, or category, "cold," is affirmed. Through the extension of the meaning of "cold", the ice cream comes to acquire meaning for the person. The process of predication also involves qualification. An example of qualification is the predication "ice cream is sometimes cold." Again, the meaning of "cold" is extended to ice cream, but the extension of this meaning is qualified.

The process of predication not only involves affirmation and qualification, as has been illustrated above, but also denial. Generic oppositionality is intrinsic to the

predicational process. Generic oppositionality is "a general aspect of the predicational process in which targets fall either under or beyond the meaning being extended by the predicate" (Rychlak, in press) For example, the predication "ice cream is white," is different from the broader pattern of meaning "cold" which is being extended. "Difference obtains when this sameness is negated, thereby removing the target from the subsuming meaning without implying any further direction of meaning-extension" (Rychlak, in press). For example, in the statement "ice cream is white," the idea of "cold" is not extended to "ice cream," which is predicated as being "white." "White" therefore would not be included in the broader pattern of meaning, "cold," lying outside of this category. Although "white" and "cold" are different, they are not mutually exclusive. Ice cream can be both "white" and "cold." Therefore the predication "ice cream is white" does not imply or negate the idea of "cold."

The process of generic oppositionality also includes contents not only different from the extended meaning, but also opposite.

> "Delimiting oppositionality: Bounds a specific meaning that stands in relation to its bipolar counterpart, as when 'injustice' delimits 'justice' and vice versa. Delimiting oppositionality involves the contents of the predicational process, enabling the reasoner to draw implications. Thus certain opposites lend a direction to thought, as when saying 'John is not reliable' implies he 'is' unreliable." (Rychlak, in press)

Unlike contents that are different, contents that are opposite are mutually exclusive. Something cannot be both "cold" and "hot." Therefore, contents that are opposite usually imply each other. The statement that "the ice cream is white" does not imply anything

about the other aspects of the ice cream, like its temperature, whereas the statement "the ice cream is cold" would imply that it is "not hot." Contents that are opposite, unlike contents that are simply different, delimit each other suggesting a direction of meaning-extension towards their bipolar counterparts. For example, the statement that "ice cream is cold" points the direction in the child's thought towards the idea of "hot" as the counterpart of "cold," which is negated by the child's predication.

According to LLT, generic oppositionality is essential to the process of predication and not a by-product which is acquired. In order to know that something is "cold," one must have an implicit understanding of what "hot" is. The meaning of "cold" is delimited by the meaning of "hot." The process of affirmation and denial of extended meaning are both intrinsic to the predication process according to LLT.

Empirical Support for Logical Learning Theory

Over the years many studies have been conducted by Rychlak and his colleagues on the different areas of Logical Learning Theory (LLT). An aspect of LLT that has received much attention is affective assessment. Affective assessment is "A transcendental telosponse -- an innate capacity to judge (via dialectical division) the meanings of one's concepts, premises, and even telosponses, characterizing them as either positive or negative in meaningfulness" (Rychlak, 1988 p.509). Since contents, or objects, are characterized as either "liked" or "disliked," affective assessment involves delimiting oppositionality. The assertion that the affective assessment of words occurs independent of the frequency of their association is supported by Abramson, Tasto, and Rychlak (1969). Abramson et al. (1969) found that the amount of learned CVC trigrams was

correlated with the subject's positive affective assessment and not with the association value of the CVC trigrams. The idea that the process of predication, which includes affective assessment, is not reducible to word associations and syntax is further supported by research on LLT (Rychlak, Stilson, & Rychlak, 1993). Since the process of predication occurs independent of the frequency of association of words, affective assessment should be operative in young children who have little exposure to word usage. Rychlak (1975) found that although affective assessment increased elementary school children's memory of designs and abstract paintings for all of the grades studied, first graders relied the most heavily on affective assessment. Rychlak, Williams and Bugaj (1986) directly studied oppositionality. Rychlak et al. (1986) found that college students learned a list of names better when they were described using oppositional features; e.g. "Charles is quiet. Douglas is outspoken." than when non-oppositional adjectives were used like "quiet, cautious" (Rychlak, 1988). Rychlak and Barnard (1993) also found that subjects significantly remembered more words when they were instructed to rate these words along an oppositional dimension than when they were instructed to categorize the words using non-oppositional descriptors. Slife, Stoneman, and Rychlak (1991) studied the effects of the relationship between associated targets and predications. In one of the conditions, the associated targets presented to the subject were opposite to the given predication. In the other condition, the targets were irrelevant to the given predication. For example, if the given predication was "past," then the target in the oppositional condition would be "current," and in the irrelevant condition it would be "calm." Slife et al. (1991) found that subjects recalled more opposite than irrelevant words. Rychlak,

Barnard, Williams, and Wollman (1988) plotted a learning curve which depicted an increase in oppositional learning across trials. Although, identical words were learned more rapidly than oppositional words during first exposure, over future exposures (five), the difference disappears. This was a rank order and not a statistically significant difference.

Rychlak (in press) found that when given a sentence, subjects chose answers that were opposite, demonstrating that an implication toward the opposite occurs. For example, the subjects were given sentences like "Karen's face reflected an emotional mood, but it was not happiness." A significant number of subjects chose the response, "Karen was sad," instead of the response that was simply different, i.e. "Karen was bored."

Theories of Categorization

Logical Learning Theory can be discussed using the language of categorization. The organization of knowledge has been investigated in developmental psychology through the study of children's categories. Categories, like predicates, are broader, organized patterns of meaning. Therefore, based on LLT, categorization can be described as the process of extending meaning from categories, or predicates, to targets. Unlike mediational models, on which most theories of categorization are based, LLT theorizes that meaning is created through the process of predication and does not exist external to the person. Therefore, LLT would not theorize that categories, or broader patterns of meaning, exist independent of the process of predication. Within the current literature, the ambiguity present between the process of categorization (verb) and categories (noun)

results in confusion as to which is the product and which is the producer. However, LLT distinguishes between the process of predication (verb) and the resultant predicates (noun).

> "The Greek word *Kategorein* means 'to predicate'; so in a true sense, when we seek categories (classifications, schemata, species, and so on) we are attempting to find a wider range of meaning that can frame and lend meaning to a targeted item of our interest." (Rychlak, in press)

Unlike Logical Learning Theory, the current theories of categorization in developmental psychology, as will be shown by this author, are based on a mediational model. Therefore, the aim of the current research on categorization is to discover the amount and types of inputs which are influential to the process of categorization. Since, traditionally, the study of organized patterns of meaning in developmental psychology has been addressed in terms of categorization, a sampling of these studies will next be reviewed.

Current Theories of Categorization

Kemler-Nelson's theory of analytical and holistic reasoning provides an example of a theory based on a mediational model. According to Kemler-Nelson (1984), the categorization of an object is determined by the similarity of the attributes of the object. Thus, the similarity of attributes directs the process of categorization. Kemler-Nelson (1984) states that analytical reasoning occurs when the stimulus is contrasted attribute by attribute. Holistic reasoning, according to Kemler-Nelson (1984), involves the categorization of the stimuli according to the "overall similarity" of the stimuli. In Kemler-Nelson's (1984) study involving kindergartners and fifth graders, she found that holistic reasoning develops before analytical reasoning. Ward (1990) refutes Kemler-

Nelson (1984) by discussing findings from research he and his colleagues conducted which found that young children use analytical rather than holistic reasoning.

Neither analytical nor holistic reasoning as defined by Kemler-Nelson (1984) and Ward and Scott (1987) entails an idea of similarity as perceived or conceived by the person. Instead, similarity is assumed to be an objective quantitative attribute of the relationship between external objects. Even though Kemler-Nelson's (1984) theory of analytical and holistic categories presents a new alternative to cluster views of categorization as witnessed in the following quote, neither theory presents an alternative in which the process of categorization frames or otherwise determines content meanings (i.e. categories).

> "Particularly evidence generated by Rosch and her colleagues (cf. Mervis & Rosch, 1981) has led psychologists and psycholinguists to consider alternatives to the 'classical view' that conceptual categories are given by a small set of necessary and sufficient conditions that members must meet (E. E. Smith & Medin, 1981). The alternative 'cluster view' is that there are a number of characteristic attributes which are not necessary and usually not sufficient for category membership, but which form a family-resemblance structure among category members." (Kemler-Nelson, 1984, pp.774, 775)

The theories of both "cluster analysis" and holistic and analytical reasoning assume that "characteristic attributes" are important influences in the process of categorization.

The work of Ward, Vela, Perry, Lewis, Bauer, and Flint (1989) provides another example of the impact of mediational models on theories of categorization. Ward et al. (1989), studying preschoolers and second graders, refute the findings by Kemler-Nelson (1984) and other psychologists that holistic reasoning occurs prior to analytical reasoning.

Ward and Scott (1987) discuss their hypothesis that both adults and children reason analytically and not holistically. Ward and Scott also theorize that children's categories are based on the perception of one physical attribute of the stimuli. The research of Ward and his colleagues represents an attempt to identify the one physical attribute determining young children's categorization of objects.

One result of this research has been the study of the "shape bias," the hypothesis that the shape of an object, rather than its size, is an important determinant in categorization. Therefore, according to Ward and Scott (1987), if a child is presented with an ice cream cone that matches the shape of one of the exemplars of the given categories, the child will place it in that category even if the two items are of vastly different size. The "shape bias" is discussed by Ward and Scott as a principle that occurs external to the child's thoughts or predications, determining the organization of his or her ideas. The work of Ward and his colleagues provides an example of the many studies conducted to assess which features of the contents, or objects, to be categorized determine categorization. The studies discussed provide an example of the emphasis on the attributes or features of the targets of categorization as an important determinant of the process of categorization.

Although Shepp (in Rosch, 1984, chp. 6) theorizes that categories are either integral or separable and not analytical or holistic, his research provides another example of the search in developmental psychology for the defining characteristics of contents that determine categorization. Integral categories, according to Shepp (in Rosch, 1984), are categories whose members have dimensions perceived as unitary wholes, whereas the

values of separable categories are perceived as distinct. Shepp provides the example of hue and brightness as a content that is perceived as integral, and radius and circle as contents that are perceived as separable. It is not the process of categorization which determines whether a stimulus is perceived as integral or separable, but the structure of the stimulus that determines its categorization according to Shepp. The categorization of an object as separable or integral is not determined by the person but by the property of the structure of the object. This point is further demonstrated by Shepp's (in Rosch, 1984) findings that first graders categorize objects as separable which fourth graders categorized as integral due to the first graders' lack of selective attention and their inability -- according to Piaget -- to decenter. Shepp's interpretation of the results assumes that the dimensions exist externally to the child or "out there," and the child's categories simply map these dimensions. Therefore, young children's categories are deficient, since they have an inability to perceive existing physical structures which cause categorization.

Rosch (1984, chp.2) theorizes that not only the correlation of features in the external world (e.g. feathers and wings), but also cultural categories determine the categories that the person possesses. Within Rosch's theory, both cultural categories and physical correlated features are determinants extrinsic to the person mediating the process of categorization. Rosch (1984) differentiates between three types or levels of categories: superordinate, basic, and subordinate. Superordinate categories, according to Rosch, are categories whose members share only a few features that do not overlap with features contained in other categories. Rosch (1984) provides the example of the categories "furniture" and "tree" as examples of superordinate categories. "Furniture" meets the

criterion for a superordinate category, since there are many types of furniture with varying physical attributes not shared by all pieces of furniture. In addition, few of the physical attributes of furniture are found in objects categorized as "tree." Superordinate categories, according to Rosch (1984), are categories which are most determined by culture.

One level below superordinate categories, according to Rosch, are basic level categories like "chair" or "oak." Rosch states that basic level categories closely mirror reality. The other type of categories are subordinate categories, which contain most of the features of the object, but these features commonly overlap with features contained in other categories. For example, "kitchen chair," and "living room chair" are subordinate categories. The type of categorization which occurs, according to Rosch (1984), is driven by the principle of cognitive economy.

Rosch's typology of categories has led to research designed to determine which categories children develop first based on their abilities to perceive and attend to features in the external world. An example of this research is the study done by Mandler and Bauer (1988) in which the order that 12, 15, and 20-month-old children touched toys was recorded. Mandler et al. (1988) hypothesized that children touch toys repeatably in the order which corresponds to their categories. They conclude that children form superordinate categories from basic level categories at an early age. Since, according to Rosch (1984), basic level categories mirror reality, these categories would involve little cognitive processing on the child's part and should therefore develop first. According to Rosch, the other levels of categories are also mediated by objects independent of the child. However, the integration of the features of these objects involves more cognitive

processing, since subordinate categories contain features that overlap with other categories, and subordinate categories are the most distinctive categories requiring the greatest perceptual awareness.

Rosch (1984) elaborates on the current idea of similarity as determined by the correlation of shared physical features to develop the idea of prototypicality. A prototype is the most representative member of a category. Rosch (1984) refers to the prototype as the mean or mode of the attributes of a category. For example, Rosch (1984) found that in categories determined by size, the prototype was the mean of the sizes of the category members. In addition to being the mode or mean of the attributes of the category, prototypes have the fewest features in common with other categories. This formulation shows the extent to which categories within Rosch's theory are defined and determined by attributes. Rosch, unlike other theorists, does not believe that the attributes which determine categorization are always physical attributes. Sometimes, according to Rosch, these attributes are contextual; however, the context exists external to the person influencing the process of categorization and is never subjective. The extent to which attributes determine categorization, according to Rosch, is related to the frequency with which they are encountered. The categorization of an object is determined by the nearness of its features to the prototype of one category and the amount its features overlap with the features of other categories.

All of the above theorists discuss similarity in terms of the similarity between contents which determine categorization. When two objects have similar attributes or features, they are categorized together. Since it is the contents, or objects themselves, that

determine how they are categorized, the notion of difference has little relevancy to mediational theories. Difference is simply defined by current theories of categorization as features that are not similar. Difference is not an important idea in mediational theories, since the person does not conceive of the objects as similar and thus does not need to know that the objects could be dissimilar. The insignificance of the notion of difference is illustrated by Rosch's quote.

> "As Wittgenstein (1953) pointed out, categorical judgements become a problem only if one is concerned with boundaries -- in the normal course of life, two neighbors know on whose property they are standing without exact demarcation of the boundary line. Categories can be viewed in terms of their clear cases if the perceiver places emphasis on the correlational structure of perceived attributes such that the categories are represented by their most structured portions." (Rosch, 1984, p.36)

The idea of difference is important if the process is not determined by external objects but by the person. If this is actuality the case, then the person must be able to judge the category to which the object belongs. Unlike the above theories, the process of generic oppositionality, intrinsic to the predicational process, is an important part of LLT. As has been shown, LLT is not just another theory of categorization, but rather a theory in which the process of predication creates meaning. If meaning exists external to the person, then the person is nothing more than the passive recipient of knowledge. The knowledge which the person possesses, according to mediational models of theorizing, is simply a matching mirror of reality. Oppositionality is not, according to LLT, something that is acquired as a result of external inputs. Generic oppositionality is a process without which meaning would not exist and learning could not occur.

The Present Study

The goal of the present study is to explore children's use and understanding of oppositionality. As has been shown, oppositionality is an area of study which has received little attention in the developmental literature. The research which has directly studied oppositionality has focused on the learning or memorizing of words that are opposite. For example, Kreutzer, Flavell, and Leonard (1975) found that as children grow older they find oppositionality to be a beneficial heuristic device in the memorization of words. In a study done by Kreutzer et al. (1975), it was found that when presented with the choice of memorizing a list of words that were arbitrary ("Mary-walks") or a list of oppositional words ("girl-boy"), kindergartners showed no preference and the first graders were split as to which list they would prefer to learn. However, the rest of the grades, second through fifth, overwhelmingly preferred to learn a list of opposite words. This research supports the idea that as children grow older their recognition of oppositional words, as distinct from words that are simply different, increases. In other words, the use of delimiting oppositionality increases with age. This is not surprising, since delimiting oppositionality involves the contents of the process of generic oppositionality, and these contents are often learned as children grow older.

The research proposed in this thesis is aimed at studying the development of oppositionality independent of the learning of syntax. This goal finds support in the research done by Levine and Carey (1982). Levine and Carey (1982) studied two and three year old children's syntactical usage and semantical understanding of "front" and "back." They found that children understand "front" and "back" through their

performance of tasks involving lining up stuffed animals for a parade. They found that this understanding occurred before the children learned the words "front" and "back." Based on this research, the current study proposes to explore children's spontaneous usage of opposites and the recognition and understanding of oppositionality of kindergartners through fifth graders.

Hypotheses and Rationale

Hypotheses.

Hypothesis I: Children will use words that are opposite across the ages studied (kindergarten through fifth grade). This will occur even though children do not know the meaning of the word "opposite."

Hypothesis II: The use of oppositional words and the ability to recognize and detect opposites will increase with grade level.

Hypothesis III: Developmental improvement will be seen in the recognition and detection of opposites over the grade levels, but at a less pronounced rate than the use of oppositional words.

Rationale.

According to Logical Learning Theory, the predicational process is innate. Therefore, children from birth onward are categorizing objects through the process of predication (Rychlak, in press). Intrinsic to predication is the process of generic oppositionality. Since generic oppositionality is an intrinsic part of the predicational process, it should be evidenced in all children, including children who do not know the meaning of the word "opposite." Therefore, children at all of the studied grade levels should be able to provide words that are opposite. Children who do not know the meaning

of the word "opposite" should not do as well on tasks that include the word "opposite" in the instructions i.e., "Are the two words opposite?" and "Pick out the two sentences that are opposite."

Hypothesis II and Hypothesis III focus on the developmental changes that occur in children's use of oppositionality. According to LLT, the contents of the categories change with age as a result of exposure, but the process itself does not develop (Rychlak, in press). Therefore, with the expansion of language, children will be able to recognize and detect opposites, which according to Hypothesis I, they were using before they possessed a knowledge of oppositionality. Since delimiting oppositionality involves word contents (e.g. "hot-cold") that are opposite, with an increase in vocabulary, children will know more opposite meanings to these vocabulary items. The most difficult aspect of oppositionality for children should therefore be the recognition and detection of opposites. It is predicted that children will have low scores on the task that requires the recognition of opposites, since this entails the knowledge that words belong to the linguistic category labeled "opposites."

The reason that it should be difficult for children to differentiate between sentences that are opposite and sentences that are different is that both different and opposite are aspects of the same process -- generic oppositionality. Targets that are different and targets that are opposite both lie outside of the realm of meaning being extended. However, oppositionality also involves a relationship between contents which are mutually exclusive, suggesting a direction of meaning-extension towards their bipolar counterpart. To know that the words "hot" and "cold" are opposite, and not simply different, one has

to understand the relationship between the words "hot" and "cold." The child must also understand the difference between contents that are opposite and contents that are simply different. Contents that are opposite are different from the meaning being extended and possess a more involved relationship than contents that are merely different. To be able to select sentences that are opposite and not just different requires an understanding of oppositionality.

CHAPTER III

METHOD

Participants

The participants were 127 children, 60 males and 66 females, grades first through fifth from four different Chicago parochial schools varying from high to low SES. There were 19 kindergartners (10 males, 9 females), 27 first graders (10 males, 17 females), 21 second graders (8 males, 13 females), 24 third graders (15 males, 9 females), 17 fourth graders (9 males, 8 females) and 19 fifth graders (9 males, 10 females). Two kindergartners were dropped from the study because one did not speak any English and the other did not want to complete the session.

Independent and Dependent Variable

The independent variable was a questionnaire which consisted of four subsections, each designed to test a different aspect of oppositionality; i.e., use of opposite words, understanding of the meaning of the word "opposite," recognition of words that are opposite, and ability to identify opposite sentences (see appendix A). The dependent variable was the children's answers to the questionnaire. The scoring of the questionnaire will be discussed in terms of each subsection. (See Appendix D for the actual scores).

Subsection I. The first section was designed to test whether children provided answers which were opposite prior to any discussion of oppositionality. It was comprised

of fifteen questions. (See appendix A for exact questions). All of the questions were written in the format: "if X isn't doing Y, what is X doing?" For example, "If Mary isn't going into the house, where is she going?"

Scoring of subsection I. The children were scored as either providing an opposite or non-opposite answer. An example of an opposite answer to the question "If Mary isn't going into the house, where is Mary going?" would be "She is going outside." Answers that did not incorporate the idea of going outside were scored as non-opposite. A common answer that was scored as non-opposite was "She is going to the store." The possible range of scores was 0-15.

Subsection II. The purpose of this section was to discover whether children knew the meaning of the word "opposite." In this section the children were directly asked if they could define and provide an example of something that was opposite. The children were also asked "Is opposite the same as different?" Then they were asked to "give an example of two things that are different but not opposite." Children who could not provide an example of two things that are opposite were given several examples of opposites (e.g. "hot-cold"). The children were then given two words that were different but not opposite in order to test if they fully understood the concept.

Scoring of subsection II. Children were scored as "knowing opposites" if they could either define opposite or provide an example. A child would, therefore, be scored as "knowing opposites" if he or she provided the example "hot-cold." However, if children provided an example of two things that are different, "green-red," they were not considered as understanding oppositionality. The children's definition of opposite as

"things that are different" did not qualify as a definition of opposite. The scores were used to divide the children into two categories: those who did not the meaning of the word "opposite," and those who did know the meaning of the word "opposite."

In order to establish interrater reliability in the decision as to whether either the subject's definition or example of opposite was appropriate, 101 subjects were randomly selected across the grade levels tested, and two raters made the judgement as to the "appropriateness" or "inappropriateness" of the definitions and examples rendered. The ratings were completely independent. A percent-agreement score was then determined by dividing the agreements between the two raters by their agreements plus disagreements (i.e., the total judgments made). It was found that there was a 95% agreement between the two raters.

Subsection III. The purpose of this section was to test whether children provided and recognized answers that are opposite. The recognition of words as opposite involves the children's understanding of oppositionality. This section involved two parts: (1) the children's responding with a word which is opposite and (2) the recognition of the word as opposite. After having discussed in the previous section the concept of oppositionality, the children were given eleven sentences to finish. For example, "If Jack is not fat, he is ___." The child was then asked if fat and the answer she or he provided were opposite.

Scoring of subsection III. There were two scores for subsection III: subsection IIIa and subsection IIIb. Subsection IIIa is comprised of a score representing the number of opposite responses the children provided. Each response was scored as either opposite or not opposite. The possible range was 0-11.

Subsection IIIb assessed the children's ability to recognize words as opposite. A child was scored as recognizing a word as opposite if (1) the child provided an oppositional word (scored in subsection IIIa) and (2) said that the word was opposite. The possible range was 0-11.

The scores on subsection IIIa and subsection IIIb are not independent, since a child must receive a score on subsection IIIa (provide an opposite word) in order to receive a score on subsection IIIb (recognize that the word provided is opposite from the given word).

Subsection IV. The final section of the questionnaire was designed to test the children's ability to identify a pair of sentences that are opposite. In the final section of the questionnaire the children were given eleven sets of four sentences. Each of the sets of sentences contained a pair that was opposite and a pair that was different. The child was instructed to pick out the two sentences that were opposite. For example, one set of sentences was: (1) "Mary's room was messy." (2) "Jane's room was clean." (3) "Linda's room was large." and (4) "Beth's room was dirty." The purpose of this section was to test the children's ability to identify a pair of sentences that is opposite from among a set of sentences containing pairs of sentences that are same or different.

Unlike in section III, children in section IV had to choose a whole sentence that is opposite and could not simply rely on knowing words that are opposite. This is the case since in some of the questions, two sentences contained the same opposite word. For example, the child must choose whether "Laura ate a hot lunch." or "Linda ate a hot sandwich" is opposite of "Mary ate a cold sandwich." (emphasis added).

Scoring of subsection IV. In subsection IV the children were scored as having identified opposites if they chose two of the given sentences which were opposite. They were scored as not identifying opposites if they picked two sentences which were not opposite. The possible range was 0-11.

Procedure

Each child was individually tested. The children were tested in a location set aside for the experiment. Before the questionnaire was administered, time was spent with the child making him or her feel at ease in the testing situation. The added time helped children overcome their shyness. The experimenter also spent time interacting with the students and faculty at each of the different schools so that the children did not perceive her as a stranger.

The subsections of the questionnaire were administered in the same order to all subjects, although the questions within each subsection were administered in a random order. For subsection IV the sentences were printed on individual pieces of paper which the children could handle. Each sentence was pointed to as it was repeatably read to the child. After the child had selected the two sentences in subsection IV the sentences were read to the child to make sure that these were the sentences the child had meant to select. This procedure was followed so as not to discriminate against children who could not read.

Results

The dependent measure was the number of correct answers provided by the child for each subsection of the questionnaire. The exact scoring of each subsection is presented above. (See Appendix B for the raw scores).

The number of correct answers for each subsection was summed for each child. For example, a child might have received a score of 8 on subsection I (providing opposite words), 9 on subsection IIIa (providing opposite words), 7 on subsection IIIb (recognizing opposite words), and 7 on subsection IV (selecting two sentences that are opposite). Since the scores were summed for each subsection for each individual, the above score of 7 on subsection IV would mean that the child picked 7 sentences reflecting opposition out of a set of 11 sentences in which both opposite, same, and different sentences were provided. The child would also be categorized based on subsection II (defining opposite) as either knowing or not knowing the word "opposite." Each hypothesis was individually tested.

Hypothesis I. The first hypothesis predicted that children who did not know the meaning of the word "opposite" would still use oppositional words. Children were scored as not knowing what the word "opposite" meant if in subsection II they could not define or provide an example of something that is "opposite." Only 6 (of 127) subjects (2 fifth graders, 2 fourth graders, and 2 third graders) could define "opposite." Five of the 6 subjects defined opposite as "exact different of something else," and one subject (3rd grade) defined it as "the reverse of something." Both of these are definitions of delimiting oppositionality, since they suggest a direction towards the bipolar counterpart of the target. The other 121 subjects either could not define the word "opposite" or provided the definition "something different from something." Since this definition does not directly address oppositionality, it was not considered acceptable.

Most subjects could provide an example of something that was opposite. The two most frequent examples given were "up-down" and "stop-go." Examples of objects that

were different but not opposite (e.g., green-red) were not counted. A majority of the 25 (of 127) subjects who did not know what the word "opposite" meant provided examples of two objects that were different. Out of the 25 subjects who were scored as not knowing the word "opposite" there were 10 kindergartners (n=19), 7 first graders (n=27), 2 second graders (n=21), 3 third graders (n=24), 2 fourth graders (n=17), and 1 fifth grader (n=19). As discussed above in the discussion of subsection II, the interrater reliability check, which was conducted using a percent agreement score for 101 subjects, was 95%.

In order to test hypothesis I, which predicted that children who do not know the word "opposite" will use oppositional words, the performance of the subjects who did not know what the word "opposite" meant were tested against the performance of the 102 subjects who knew what the word "opposite" meant. A Chi-Square (Hays, 1988, pp. 775-779) was run on subsection I (provide words that are opposite) and subsection II (knowledge of the word "opposite"). (See table 1 below). The subjects were categorized as either "using many opposite words" or "not using many opposite words" based on the median of the arrayed scores. The Chi-Square test yielded a value of $X^2 = 8.68$, $\underline{df} = 1$, $\underline{p} < .01$. (See table 1 below).

TABLE 1

FREQUENCY OF USE OF OPPOSITIONAL WORDS

FOR SUBSECTION I

	SUBSECTION II	
	Do Not Know Opposites	Know Opposites
SUBSECTION I Used Many Opposite Words	6	58
Did Not Use Many Opposite Words	19	44

In order to check the reliability, a Chi-Square was also run on subsection IIIa (provide words that are opposite) and subsection II (knowledge of the word "opposite"). Subjects were categorized as "using many opposite words" based on a median split of the arrayed scores. The analysis resulted in a $X^2 = 20.82$, $\underline{df} = 1$, $\underline{p} < .01$. (See table 2 below).

TABLE 2

FREQUENCY OF USE OF OPPOSITIONAL WORDS

FOR SUBSECTION IIIa

	SUBSECTION II	
	Do Not Know Opposites	Know Opposites
SUBSECTION IIIa Used Many Opposite Words	2	60
Did Not Use Many Opposite Words	23	42

Since 17 of the 25 subjects who did not know the word "opposite" were in kindergarten and first grade, a Chi-Square was conducted to test whether the performance of kindergartners and first graders who did know the word "opposite" differed from that of kindergartners and first graders who did not know the word "opposite." A test was conducted only on kindergartners and first graders to control for a possible effect for improvement in performance due to increase in grade level. A median split of the arrayed scores was used to categorize the children as either "using" or "not using" many opposite words. An analysis of subsection I (provide words that are opposite) and subsection II (define opposite) yielded a $X^2 = 2.32$, $\underline{df} = 1$, $\underline{n.s.}$ (See table 3).

TABLE 3

FREQUENCY OF USE OF OPPOSITIONAL WORDS

FOR SUBSECTION I

	SUBSECTION II	
	Do Not Know Opposites	Know Opposites
SUBSECTION I Used Many Opposite Words	6	17
Did Not Use Many Opposite Words	11	12

A Chi-Square was also run on subsection IIIa (provide words that are opposite) for kindergarten and first grade. The analysis yielded a $X^2 = 5.68$ $\underline{df} = 1$, $\underline{p} < .05$ (See table 4 below).

TABLE 4

FREQUENCY OF USE OF OPPOSITIONAL WORDS

FOR SUBSECTION IIIa

	SUBSECTION II	
	Do Not Know Opposites	Know Opposites
SUBSECTION IIIa Used Many Opposite Words	5	19
Did Not Use Many Opposite Words	12	10

The result showed that there was a significant difference between the amount of opposite words used by children who were categorized as "knowing opposite" and children who were categorized as not "not knowing opposite." There was not a significant difference between the performance of kindergartners and first graders who did and did not know the word "opposite" for subsection I. For subsection IIIa, which was conducted after the experimenter had discussed the meaning of "opposite" with the children, there was a significant difference in performance between the two groups of children.

Although children who knew what the word "opposite" means used significantly more opposite words than the children who did not know what the word "opposite" means, the latter still provided words that were opposite. The mean number of opposite words for subsection I provided by the 25 subjects who did not know what the word "opposite"

means is 9.24 with a standard deviation of 3.41. The least amount of opposite words provided was 2 given by one kindergartner and 4 given by two kindergartners. The rest of the 25 subjects provided 7 or more opposite words for subsection I. For subsection IIIa, the mean number of opposite words provided by the 25 subjects, who were categorized as not knowing "opposite" is 8.59 with a standard deviation of 2.18. The subjects who did not know the meaning of the word "opposite" used less words that are opposite than subjects who knew the meaning of the word. However, the former subjects still provided words that are opposite.

Hypothesis II. Hypothesis II predicted that children's use of opposites and ability to recognize and identify opposites would increase with grade level. The means and standard deviations for the raw scores for the different subsections at the different grade levels are presented below in table 5.

TABLE 5

CELL MEANS AND STANDARD DEVIATIONS

FOR THE RAW SCORES

	Subsections				
Grade	I	IIIA	IIIb	IV	Marginal X
K	7.68 (3.20)	7.89 (2.45)	6.32 (3.61)	5.26 (3.02)	6.79 (1.23)
1	10.30 (1.92)	9.52 (1.40)	7.78 (3.43)	7.15 (3.07)	8.69 (1.47)
2	11.81 (1.60)	10.62 (0.67)	10.10 (2.40)	10.10 (0.83)	10.66 (0.81)
3	12.67 (1.74)	10.58 (0.58)	10.54 (0.66)	9.96 (1.54)	10.94 (1.19)
4	12.24 (2.08)	10.65 (0.61)	10.59 (0.62)	10.47 (0.72)	10.99 (0.84)
5	13.37 (1.12)	10.89 (0.32)	10.84 (0.37)	10.63 (0.06)	11.43 (1.30)
Marginal X	11.34 (2.07)	10.02 (1.15)	9.36 (1.86)	8.93 (2.20)	9.92 (1.98)

Standard deviations in parenthesis

Possible Ranges
Subsection I = 1 - 15
Subsection IIIa = 1 - 11
Subsection IIIb = 1 - 11
Subsection IV = 1 - 11

In order to test hypothesis II, which predicted that children's ability to use, recognize and identify opposites would improve with grade level, each subsection was individually tested. Three One-Way ANOVAs (Collyer & Enns, 1993, chp. 2) were

conducted using subsection I (providing opposite words), subsection IIIb (recognizing opposite words), and subsection IV (selecting two sentences that are opposite). These subsections were used because they tested the use, recognition, and identification of opposites. Subsection IIIa was not used, since it is not independent of subsection IIIb. In order to receive a score on subsection IIIb (recognize a word as opposite), the subject must receive a score on subsection IIIa (provide a word that is opposite). The scores for all of the subjects were used, both those who were categorized as knowing and not knowing the word "opposite."

In order to test the hypothesis that grade level (independent variable) influenced performance on subsection I, subsection IIIb, and subsection IV (dependent variable), three One-Way ANOVAs were conducted. The first One-Way ANOVA tested whether grade level had an effect on performance on subsection I (provide words that are opposite). The effect for grade level was $\underline{F} = 20.75$, $\underline{df} = 5, 121$, $\underline{p} < .001$. (See table 6 below).

TABLE 6

SUMMARY OF ONE-WAY ANOVA FOR

PERFORMANCE ON SUBSECTION I

Source	df	MS	F	p
Between Groups	5	11.61	20.75	.001
Within Error	121	0.56		
TOTAL	126			

(Collyer & Enns, 1987, p. 56)

In order to identify where the differences occurred, a post hoc analysis was conducted on the means for each grade on subsection I using the within error term from the above ANOVA. A Tukey HSD revealed that there was a significant difference between kindergarten and each of the other grades, and between first, third, fourth and fifth grade. There were no significant differences for the other grade levels. (See table 7 below).

TABLE 7

TUKEY HSD FOR THE MEANS AT GRADE LEVELS

FOR SUBSECTION I

		GRADES				
GRADES	K	1	2	3	4	5
K		*	*	*	*	*
1				*	*	*
2						
3						
4						
5						

* = $p < .05$
(Hays, 1988, p.419)

In order to test the prediction that the recognition of opposites would improve with grade level, subsection IIIb (recognition of opposite words) was used. A One-Way ANOVA was conducted. The effect for grade level was $\underline{F} = 17.06$, $\underline{df} = 5, 121$, $\underline{p} < .001$. (See table 8 below).

TABLE 8

SUMMARY OF ONE-WAY ANOVA FOR

PERFORMANCE ON SUBSECTION IIIb

Source	df	MS	F	p
Between Groups	5	10.44	17.06	.001
Within Error	121	0.61		
TOTAL	126			

(Collyer & Enns, 1987, p. 56)

In order to identify where the differences occurred, a post hoc analysis was conducted on the means for the grade levels on subsection IIIb using the within error term from the above ANOVA. A Tukey HSD revealed that there was a significant difference between kindergarten and each of the other grades and between first grade and each of the other grades. There were no significant differences for the other grade levels. (See table 9 below).

TABLE 9

TUKEY HSD FOR MEANS AT GRADE LEVELS

FOR SUBSECTION IIIb

	GRADES					
GRADES	K	1	2	3	4	5
K		*	*	*	*	*
1			*	*	*	*
2						
3						
4						
5						

* = $p < .05$
(Hays, 1988, p.419)

In order to test the prediction that there would be an improvement in the ability to identify opposites with an increase in grade level, subsection IV (ability to choose two sentences that are opposite) was used. A One-Way ANOVA was conducted. The effect for grade level was $F = 23.74$, $df = 5, 121$, $p < .001$. (See table 10 below).

TABLE 10

SUMMARY OF ONE-WAY ANOVA FOR

PERFORMANCE ON SUBSECTION IV

Source	df	MS	F	p
Between Groups	5	12.41	23.74	.001
Within Error	121	0.52		
TOTAL	126			

(Collyer & Enns, 1987, p. 56)

In order to identify where the differences occurred, a post hoc analysis was conducted on the means of the grade levels for subsection IV using the within error term from the above ANOVA. A Tukey HSD revealed that there was a significant difference between kindergarten and each of the other grades and between first grade and each of the other grades. There were no significant differences for the other grade levels. (See table 11 below).

TABLE 11

TUKEY HSD FOR MEANS AT GRADE LEVELS

FOR SUBSECTION IV

	GRADES					
GRADES	K	1	2	3	4	5
K		*	*	*	*	*
1			*	*	*	*
2						
3						
4						
5						

* = $p < .05$
(Hays, 1988, p.419)

The results support the hypothesis that children's use, recognition, and identification of opposites increases with grade level. The post hoc analysis revealed that the performance for kindergartners on each subsection tested, subsection I (use of opposite words), subsection IIIb (recognition of opposite words), and subsection IV (identification of opposite sentences) was significantly different than the performance of the other grade levels. For subsection I (use of opposites), there was no significant difference between the performance for first and second grade; whereas for subsection IIIb (recognition of opposite words) and subsection IV (identification of opposite sentences), there were significant differences between first grade and each of the other grades.

Hypothesis III. Hypothesis III predicted that developmental improvements would be seen in the recognition and identification of opposites over the grade levels but at a less

pronounced rate than the development of the use of oppositional words. Whereas hypothesis II predicted that an improvement in performance would occur with development, hypothesis III specifies that improvement would be more pronounced for the use of oppositional words than for the recognition and identification of opposites. In hypothesis III, unlike in hypothesis II, the emphasis is on the difference in the performance on the different subsections. Therefore, in order to test hypothesis III, a mixed model ANOVA (Collyer, & Enns, 1993, chp. 8) was used so that comparisons could be made across the subsections.

First, the scores were changed into standard z scores (Hays, 1988, p.180). The purpose of transforming the data into z scores was to create a common scale to allow for the possibility of making comparisons across the subsections in order to test for an interaction. This was necessary since the possible range for subsection I is 0-15 and the possible range for subsection IIIb and IV is 1-11. Furthermore, no assumption could be made that these score units are identical. In order to test hypothesis II, a mixed model ANOVA was conducted using subsection I (providing opposite words), subsection IIIb (recognizing opposite words), and subsection IV (selecting a pair of sentences that are opposite). These subsections were used because they tested the use, recognition, and identification of opposites. Subsection IIIa was not used since, as discussed above, it is not independent of subsection IIIb. The scores for all of the subjects were used, both those who were categorized as knowing and as not knowing the meaning of the word "opposite."

In order to test the hypothesis that the development of the use of oppositional words would occur at a less pronounced rate than the development of the recognition and identification of opposites a 6 (grade level) X 3 (subsections I, IIIb, IV) factorial ANOVA was run on these data. The former were between subjects and the later were within subjects (Collyer, & Enns, 1993, chp. 8). The effects for grade level was $F = 35.08$ $df = 5, 121$, $p < .001$. There was not a significant effect for subsections; $F = .01$, $df = 2, 242$, n.s. A significant interaction did not occur for grade X subsection, $F = 3.26$, $df = 10, 242$, n.s. (See table 12 below).

TABLE 12

SUMMARY OF 6 X 3 ANOVA

PERFORMANCE ON SUBSECTIONS

Source	df	MS	F	p
Grade level	5	33.86	35.08	.001
Error	121	0.94		
Subsections	2	0.10	0.03	.973
Interaction	10	0.33	0.88	.554
Error	242	0.37		

(Collyer & Enns, 1987, p. 196)

In order to identify where the significant differences for grade level occurred, a post hoc analysis was conducted using the means for the standardized scores (so that comparisons could be made across subsections), and the error term from the above ANOVA. (See table 13 below).

A Tukey HSD revealed that there was a significant difference between the performance of kindergartners and each of the other grades, and there was a significant difference between the performance of first graders and each of the other grades. No significant differences were found at the other grade levels. (See table 10 below).

TABLE 13

TUKEY HSD FOR MEANS AT GRADE LEVELS

	GRADES				
GRADES K	1	2	3	4	5
K	*	*	*	*	*
1		*	*	*	*
2					
3					
4					
5					

* = $p < .05$
(Hays, 1988, p.419)

A further exploration of the data was conducted in order to assess if there were any differences for the different subsections. This was necessary since through the performance of the z transformation the means for the different subsections were set at zero, hiding any real differences which might exist. A Chi-Square goodness of fit test was run to assess whether the ability to recognize words that are opposite (subsection IIIb) and the ability to identify sentences that are opposite (subsection IV) develops at the same rate. Each grade was analyzed separately to avoid ceiling effects.

In order to study the development of the recognition of oppositionality, a frequency matrix of children who were categorized as either being able or not being able to recognize and identify opposites was created for each grade studied. Children had to recognize more than half of the words within each subsection in order to be categorized as "recognizing opposites." For subsection IIIb (possible range = 0-11) children had to recognize 6 or more words in order to be categorized as "recognizing opposites." For subsection IV (possible range = 0-11) the children had to identify 6 or more of the opposite sentences in order to be categorized as "identifying opposites." A Chi-Square goodness of fit test (Hays, 1988, pp. 775-778) was run on the frequency matrices for each grade level: number of kindergartners = 19, first graders = 27, second graders = 21, third graders = 24, fourth graders = 17, and fifth graders = 19. (See table 14 below.)

A Chi-Square goodness of fit test conducted on the frequency matrices at each grade yielded the following results: kindergarten, $X^2(1) = 0.16$, n.s., first grade $X^2(1) = 13.74$, $p < .001$, second grade $X^2(1) = 52.40$, $p < .001$, third grade $X^2(1) = 64.33$, $p < .001$, fourth grade, $X^2(1) = 51$, $p < .001$, fifth grade $X^2(1) = 57$, $p < .001$.

TABLE 14

FREQUENCY OF RECOGNITION AND IDENTIFICATION OF OPPOSITES

FOR THE DIFFERENT GRADE LEVELS

KINDERGARTEN

	SUBSECTION IV	
	Identify Opposites	Do not Identify Opposites
SUBSECTION IIIb Recognize Opposites	5	5
Do Not Recognize Opposites	4	5

FIRST GRADE

	SUBSECTION IV	
	Identify Opposites	Do not Identify Opposites
SUBSECTION IIIb Recognize Opposites	15	4
Do Not Recognize Opposites	3	5

SECOND GRADE

	SUBSECTION IV	
	Identify Opposites	Do not Identify Opposites
SUBSECTION IIIb Recognize Opposites	19	0
Do Not Recognize Opposites	1	0

THIRD GRADE

	SUBSECTION IV	
	Identify Opposites	Do not Identify Opposites
SUBSECTION IIIb Recognize Opposites	23	1
Do Not Recognize Opposites	0	0

FOURTH GRADE

	SUBSECTION IV	
	Identify Opposites	Do not Identify Opposites
SUBSECTION IIIb Recognize Opposites	17	0
Do Not Recognize Opposites	0	0

FIFTH GRADE

	SUBSECTION IV	
	Identify Opposites	Do not Identify Opposites
SUBSECTION IIIb Recognize Opposites	19	0
Do Not Recognize Opposites	0	0

Although there was a significant effect for grade level, there was no significant effect for subsection, nor was there a significant interaction. The frequency matrices revealed that an increase in performance occurred at the same rate across the subsections studied. The frequency matrices (see table 11 above) indicate that the ability to recognize and identify opposites occurred as early as second grade.

CHAPTER IV

DISCUSSION AND IMPLICATIONS FOR FUTURE RESEARCH

The results showed that children who do not know the meaning of the word "opposite" used significantly fewer opposite words than children who know the meaning of the word "opposite." For kindergarten and first grade the results showed that on subsection I, which was administered prior to a discussion about the meaning of the word opposite, there was no significant differences between the number of opposite words provided by children categorized as "not knowing the meaning of the word opposite" versus the number provided by children categorized as "knowing the meaning of the word opposite." However, for subsection IIIa there was a significant difference between the number of words that the two groups of children provided. The number of children categorized as "knowing the meaning of the word opposite" who provided words that are opposite increased after discussing the meaning of the word opposite with the experimenter. However, the children categorized as "not knowing the meaning of the word opposite" provided fewer opposite words in subsection IIIa after a discussion of the meaning of opposite occurred. This would suggest that the children did not acquire an understanding of oppositionality during their discussion with the experimenter. It appears that children who did not know the meaning of the word "opposite" did not learn it during

the course of this experiment. This supports the idea that children use "opposite" words before they know the meaning of the word "opposite."

The idea that children use opposite words before they know what "opposite" means is further supported by the fact that all of the children who did not know the meaning of the word "opposite" used words that are opposite. In addition, the mean score of the 25 subjects who did not know the word "opposite" for the number of opposite words used for both subsection I and subsection IIIb was greater than the midpoint of the scale.

It can also be concluded based on the results of this experiment that children's use, recognition, and identification of opposites increases with grade level. Each of the three One-Way ANOVAs, which tested different subsections, revealed a significant difference between the performance of the different grades. Post hoc analyses showed that for the use of opposite words (subsection I), the recognition of opposite words (subsection IIIb), and the identification of sentences that are opposite (subsection IV) the performance of kindergartners was significantly different than the performance of each of the other grades studied. The post hoc analysis for the use of opposite words (subsection I) revealed that there was also a significant difference between the performance of first graders and third, fourth, and fifth graders. There was a significant difference for the recognition of opposite words (subsection IIIb), and identification of opposite sentences (subsection IV) between first graders and second, fourth and fifth graders. There were no significant differences found between the performance of the other grade levels. The assertion by Logical Learning Theory that generic oppositionality is not learned, but is that through which the contents of delimiting oppositionality are learned, is supported by the improvement in

performance that occurred with increase in grade level. Since delimiting oppositionality involves the predication of contents as opposite, then improvement in delimiting oppositionality should be seen as children become older and are exposed to more information.

The assertion by Logical Learning Theory that generic oppositionality is innate and not learned is supported by the findings. The fact that children use oppositional words before they know the meaning of the word "opposite" supports the theory that generic oppositionality is a process that is not determined by the content which is input (i.e., a learned vocabulary). This is further supported by the fact that children's performance on the recognition of opposites was not stronger in the task which required only the recognition of words (as revealed by the significant Chi-Squares obtained at the different grade levels for subsection IIIb and IV). If children learn that certain words are opposite, then they should have experienced the most difficulty in subsection IV (ability to choose two sentences that are opposite). This subsection should have been more difficult, since children could not choose the sentences which are opposite by recognizing words that are opposite. This was prevented by using sentences that shared the same opposite word. For example, the child must choose whether "Laura ate a hot lunch" or "Linda ate a hot sandwich" is opposite of "Mary ate a cold sandwich" (emphasis added). This assertion can be further tested by conducting research utilizing more sentences which share the same words.

The goal of this study was to discover if children used opposites, could recognize words that are opposite, and identify a word as "opposite." Not only was support found

for the hypothesis that children use opposites, but it was also found that children as young as kindergartners were engaged in oppositional reasoning. However, did the children really understand oppositionality? The question remains whether children can differentiate between contents that are opposite and contents that are different but not opposite. According to LLT, intrinsic to predication is generic oppositionality, which involves the predication of a target as either different or opposite from the targeted category or predication. Unlike targets that are different, targets that are opposite delimit the meaning of the predication and suggest a direction for predication or categorization (Rychlak, in press). Through elaboration of subsection IV, involving the relationship between sentences, it would be possible to study children's understanding of the relationships of same, different, and opposite.

The present study suggests that, when given an exemplar, children can provide an opposite example and recognize it as opposite. Therefore, it is theorized that children categorize objects based on a predicational and not a mediational model. It is therefore theorized that, in the studies of categorization, the similarity of the attributes of the targets, or objects, did not cause the categorization of the targets; rather, the child categorized the target by the process of predication involving generic oppositionality. The child may have predicated that the attributes which matched one category and not the other were important.

The recommended research which has been discussed involves simple follow-ups to the present study. However, oppositionality is an important process in which children engage. Since children use oppositional reasoning, then this must influence how children

make judgments about the world. Research can also be conducted studying the moral development of children in terms of the learning of oppositionality. For example, a child who is told that "it is good to tell the truth," should reason that "lying is bad." I have only been able to present a sample of the research that can be conducted based on the findings that young children engage in oppositional reasoning. I believe that if more developmental psychologists accepted the idea that children reason oppositionally, then, as developmental psychologists, we can more accurately study children's behavior and thought.

APPENDICES

APPENDIX A

OPPOSITIONALITY QUESTIONNAIRE

Subsection I

1) If John isn't happy what is he?

2) If Mary isn't going into the house, where is she going?

3) If Linda isn't a slow runner, what is she?

4) If Jane is not going up stairs, where is she going?

5) If Karen doesn't like school, how does she feel about it?

6) If Janet doesn't think that the picture is pretty, what does she think about it?

7) If Bobby isn't tall, what is he?

8) If Mary did not play her stereo loud, how did she play it?

9) If Kathy isn't sick, what is she?

10) If Marie did not wake up, what did she do?

11) If Kevin doesn't like hot food, what does he like?

12) If Luke did not say no, what did he say?

13) If Kate did not win, what did she do?

14) If Dave did not open the door, what did he do?

15) If Linda is not first in line, what is she?

Subsection II

1) Do you know what the word opposite means? Can you define the word opposite for me?

2) Can you give me an example of two things which are opposite?

3) Is opposite the same as different?

4) Can you give me an example of two things that are different but not opposite?

If the child doesn't know what opposite means tell the child: Some examples of things which are opposite are
heavy and light
open and shut
hot and cold
fat and thin
fat and thin are opposite but fat and short are not opposite. Not everything which is different is opposite.

5) Are cold and wet opposite?

6) Are cold and wet different?

Subsection III

1) If Linda is not young, what is she _____
   a) Is young and ___ opposite?

2) If Jack is not fat, he is _____
   a) Is fat and ____ opposite?

3) If Mary did not got to sleep, she _____
   a) Is going to sleep and ___ opposite?

4) If John was not quiet, he was _____
   a) Is quiet and ___ opposite?

5) If the light is not on, it is ____
   a) Is on and ____ opposite?

6) If sand is not wet, it is ___
   a) Is wet and ___ opposite?

7) If it is not warm, it is _____
   a) Is warm and ___ opposite?
8) If it is not day, it is _____
   a) Is day and ___ opposite?

9) If the work is not easy, it is _____
   a) Is easy and ___ opposite?

10) If Jane didn't tell a lie, she told the _____
    a) Is telling the truth and ____ opposite?

11) If Mary didn't win the game, she _____
    a) Is winning and ____ opposite?

Subsection IV

1) Mary's room was messy.
   Jane's room was clean.
   Linda's room was large.
   Beth's room was dirty.
a) Which two are opposite?

2) Jack woke up.
   Mark got out of bed.
   Scot ate lunch.
   Kevin went to sleep.
a) Which two are opposite?

3) Marie ran quickly.
   Laura skipped.
   Jane ran slowly.
   Betty ran fast.
a) Which two are opposite?

4) Kathy hated the picture.
   Linda liked the picture.
   Beth disliked the picture.
   Jan drew the picture.
a) Which are opposite?

5) Laura went inside.
   Shelly went outside.
   Nancy went upstairs.
   Maggie went to the store.
a) Which two are opposite?

6) Linda ate a hot sandwich.
Jane ate a piece of pie.
Mary ate a cold sandwich.
Laura ate a hot lunch.
a) Which are opposite?

7) Kate was at the front of the line.
Mary was at the water fountain.
Jane was at the back of the line.
Becky was in the middle of the line.
a) Which are opposite?

8) Scot likes to swim in cold water.
Mark likes to drink cold soda.
Luke likes to drink milk.
Matt likes to swim in warm water.
a) Which are opposite?

9) Jane ran to the back of the house.
Linda ran inside the house.
Becky ran to the front of the house.
Mary ran around the house.
a) Which are opposite?

10) John put the book on top of the table.
Luke put the book on top of the sofa (couch).
Mark put the book under the table.
Scot put the book next to the sofa (couch).
a) Which two are opposite?

11) Henry is a tall boy.
Tiger is a short dog.
Mark is a short boy.
Garfield is a little cat.
a) Which two are opposite?

APPENDIX B

DATA FROM QUESTIONNAIRE

Key

Subj = subject number
Male = 1 Female = 2
Subsection II = Y (yes) knew "opposite" N (no) did not know "opposite"

Subj	Sex	Grade	I	II	III		IV
					A	B	
15	1	K	6	Y	7	6	3
16	2	K	4	N	5	4	0
27	2	K	9	Y	8	1	11
26	2	K	12	Y	11	11	10
14	1	K	11	N	10	7	3
42	1	K	9	N	9	0	4
5	2	K	9	N	6	5	6
29	1	K	2	N	4	4	6
30	1	K	9	Y	11	11	2
35	1	K	4	N	8	2	3
36	1	K	9	N	7	7	7
123	2	K	7	N	8	8	6
121	1	K	10	Y	8	8	5
120	1	K	11	Y	11	11	10
119	1	K	4	Y	4	4	3
118	2	K	7	Y	8	8	5
125	2	K	9	N	10	10	9
124	1	K	2	N	4	2	3
25	2	K	12	Y	11	11	4
1	1	1	10	N	10	0	6
24	2	1	13	Y	9	0	2
45	2	1	11	N	9	9	2
41	2	1	13	Y	11	11	10
40	2	1	9	Y	11	11	5
2	2	1	11	Y	11	11	10

Subj	Sex	Grade	I	II	III		IV
					A	B	
3	1	1	7	N	8	5	1
4	2	1	11	Y	11	11	10
43	2	1	9	Y	10	10	11
117	2	1	10	N	9	3	3
116	2	1	6	Y	5	5	10
115	2	1	9	N	9	3	3
95	1	1	9	Y	9	7	8
78	2	1	7	Y	10	10	9
77	2	1	12	Y	9	9	10
76	2	1	13	Y	11	11	8
74	2	1	12	Y	10	8	7
75	1	1	10	Y	8	8	9
82	1	1	15	Y	11	11	9
83	1	1	11	Y	10	10	8
87	1	1	8	Y	11	11	10
56	2	1	12	N	5	10	5
59	2	1	9	Y	9	6	5
60	1	1	10	N	9	5	6
64	1	1	11	Y	10	10	10
58	2	1	11	Y	10	10	11
57	1	1	11	Y	7	5	5
7	1	2	9	Y	11	11	11
8	1	2	11	Y	9	9	9
6	2	2	9	Y	11	10	11
48	1	2	13	Y	11	11	10
46	1	2	14	Y	11	11	11
9	2	2	12	Y	11	11	10
44	1	2	13	Y	11	11	10
28	2	2	11	Y	11	11	11
37	2	2	12	Y	11	11	10
39	1	2	10	N	10	0	9
114	2	2	13	N	9	9	9
106	2	2	13	Y	11	11	9
105	1	2	12	Y	11	11	11
107	1	2	13	Y	11	11	9
108	2	2	13	Y	11	11	10
109	2	2	13	Y	11	11	10
110	2	2	14	Y	10	10	11
111	1	2	12	Y	11	11	10
112	2	2	10	Y	10	10	11
113	2	2	9	Y	10	10	9

Subj	Sex	Grade	I	II	III		IV
					A	B	
84	1	2	12	Y	11	11	11
47	2	3	13	Y	10	10	11
10	1	3	8	N	11	11	11
11	1	3	13	N	10	10	8
12	2	3	13	Y	10	10	11
13	2	3	13	Y	10	10	8
19	1	3	14	Y	11	11	8
21	2	3	12	Y	11	11	11
18	1	3	12	Y	11	11	9
17	1	3	13	Y	10	10	11
20	1	3	11	Y	11	11	11
22	2	3	14	Y	11	11	5
23	1	3	14	N	11	11	10
65	1	3	12	Y	10	10	10
63	2	3	13	Y	11	11	11
61	1	3	15	Y	11	11	10
62	1	3	12	Y	11	11	11
93	2	3	13	Y	11	11	11
96	1	3	15	Y	11	11	11
81	1	3	13	Y	10	9	11
80	1	3	14	Y	11	11	11
79	2	3	13	Y	11	11	10
122	1	3	8	Y	9	9	8
91	2	3	12	Y	10	10	10
94	1	3	14	Y	11	11	11
34	2	4	6	Y	11	11	11
32	2	4	12	Y	11	11	10
31	1	4	13	Y	11	11	10
33	1	4	14	Y	10	10	11
92	2	4	11	Y	11	11	11
126	1	4	13	Y	11	11	11
127	1	4	12	Y	10	10	11
86	1	4	13	Y	11	11	11
104	1	4	13	Y	11	11	10
103	1	4	13	N	11	11	9
102	2	4	13	Y	10	10	9
101	1	4	9	Y	9	9	11
100	1	4	11	Y	10	10	10
99	2	4	14	Y	10	11	11
97	1	4	13	Y	11	11	10
88	1	4	14	Y	11	11	11

Subj	Sex	Grade	I	II	III		IV
					A	B	
85	1	4	14	Y	11	11	11
51	2	5	14	Y	11	11	11
52	1	5	14	N	11	11	10
53	2	5	14	Y	11	11	11
54	2	5	15	Y	11	11	11
55	2	5	13	Y	11	11	11
49	2	5	13	Y	11	11	11
50	2	5	15	Y	10	10	11
73	1	5	13	Y	11	11	10
71	2	5	13	Y	10	11	11
72	1	5	14	Y	11	11	11
70	1	5	13	Y	11	11	11
69	2	5	11	Y	11	11	11
68	2	5	14	Y	10	10	10
67	1	5	14	Y	11	11	9
66	1	5	12	Y	11	11	10
89	1	5	13	Y	11	11	11
90	1	5	11	Y	11	11	11
128	1	5	14	Y	11	11	10
129	1	5	14	Y	11	11	11

Subject # 38 -- a male Kindergartner didn't finish the interview

Subject # 122 -- a male Kindergartner didn't speak any English

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