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An investigation of the effect of using varying stimuli to assess normal children's comprehension of five locative prepositions

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Assessing children's knowledge of locative prepositions has been a focus of interest for both researchers and practicing clinicians over the past two decades (Boehm, 1969; E. Clark, 1973). Information about locative prepositions can give insight into how children acquire

understanding of these relationships, as well as providing information about assessing and facilitating this understanding in both normal and language disordered children. Speech-language pathologists routinely assess normal and language disordered children's understanding and use of locative prepositions, since these relationships are so frequently occurring in our language and appear to have value across different communicative contexts (Zyve, 1927; Lahey and Bloom, 1977).

A recurring concern in recent research appears to be the role that assessment variables play in accurately measuring children's knowledge and use of prepositions. Age and order of acquisition of prepositions has become a dynamic rather than static standard, as different ways of assessing prepositions also give different results (Johnston and Slobin, 1979; E. Clark, 1981; Johnston, 1984). These researchers have investigated assessment variables such as context (picture, object, no context) and response (self actions, manipulating, pointing) in assessing normal children's understanding and use of prepositions (Harris and Strommen, 1972; Kuczaj and Maratsos, 1975; Wilcox and Palermo, 1975; Silliman, 1979; Levine and Carey, 1982). Most have considered these variables separately, but a few have contrasted a limited number of variables with significant results for some age groups (Ault, Cromer and Mitchel, 1977; Washington and Naremore, 1978). Contrasting a number of these assessment variables across a wider age range could give more information about how normal children understand locative prepositions, and how to best assess this knowledge.

The questions posed in this study were: Are there significant differences among various tasks for eliciting five locative prepositions,

and, if so, do tasks vary in their effectiveness according to the age of the children?

Sixty children, ten within each of six age groups, aged eighteen to forty-eight months, participated in the study. All the children had normal language and hearing abilities. An investigator-developed assessment, the Test for Comprehension of Five Locative Prepositions, was administered to each child by the investigator. The Test for Comprehension of Five Locative Prepositions involved picture contexts and object contexts of varying sizes, and required manipulation, pointing and self action response modes.

Raw scores from the assessment were compared using a three-way Analysis of Variance (age x task x preposition) to determine if significant differences existed between age and task variables. Two tailed t-Test values were also computed to determine if statistically significant differences among tasks existed.

Results of the Analysis of Variance indicated that statistically significant differences existed between age and task. t-Test results also indicated significant differences among tasks across all age groups and within some age groups. Tasks involving 1) self actions (Task I), and 2) manipulating objects (Task II) elicited significantly more correct prepositions in all children. There were significant differences among tasks in the number of correct locative prepositions that they elicited in children aged eighteen months to forty-two months, but no significant differences among tasks in the forty-eight month age group.

AN INVESTIGATION OF THE EFFECT OF USING VARYING STIMULI TO ASSESS NORMAL CHILDREN'S COMPREHENSION OF FIVE LOCATIVE PREPOSITIONS

by

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CHAPTER I

INTRODUCTION AND STATEMENT OF THE PURPOSE

INTRODUCTION

Locative prepositions are relational words denoting position (E. Clark, 1980). Locative prepositions frequently occur in language (Zyve, 1927) and have a great deal of communicative potential in a variety of contexts (Lahey and Bloom, 1977). As children grow older, they understand an increasingly greater number of locative prepositions. The locative prepositions "in," "under," "next to," "in front of," and "in back of," are understood between the ages of twenty-one and forty-two months (Hedrick and Prather, 1975; E. Clark, 1980).

Researchers have been interested in assessing when normal children understand and use various locative prepositions because children appear to use different strategies in acquiring these terms as compared to how they learn other word meanings (Cox and Richardson, 1985). Consequently, assessing prepositions can give insight into normal language development and the relationship between conceptual and linguistic information.

Variables in assessing language have been described by Miller (1981) as relating to the child, the situation and the task. Miller (p. 161) feels that considering assessment variables is of primary importance and states "The meaning of assessment data is dependent upon the validity of procedures and the analysis choosen." A child's developmental level has a direct relationship to how and by what age they understand and use

prepositions, and how this knowledge is reflected in assessments. In acquiring an understanding of prepositions, children progress from a stimulus-bound to a symbolic level of behavior (Piaget, 1961; Bruner, 1966) and use linguistic and non-linguistic information to acquire this knowledge (H. Clark, 1973; E. Clark, 1977; 1980; 1983; Rosch, 1978).

In assessing how normal children understand and use language, researchers have considered how this information is best measured to accurately reflect children's knowledge. Researchers have compared using different context and task variables to assess the length and complexity of children's language and have found differences in children's performances as a result of these variables (Strandberg and Griffith, 1969; Longhurst and File, 1977; Kamhi, 1982). However, differences in performances have not been directly associated with age.

Assessment variables of context, task, and response mode have also been examined to determine how they affect children's expression and comprehension of different prepositions, according to their age (Harris and Strommen, 1972; Wilcox and Palermo, 1975; Kuczaj and Maratsos, 1975; Ault, Cromer and Mitchel, 1977; Washington and Naremore, 1978; Johnston and Slobin, 1979; Silliman, 1979; Levine and Carey, 1982; Johnston, 1984). Significant differences in children's performances on tasks assessing comprehension and use of prepositions have resulted from using varied contexts, tasks and response modes. However, these studies have not all compared task variables to one other across the same population, or consistently associated task differences to age, particularly in younger children.

Standardized assessments, those comparing children's performances to

other children the same ages, have used a variety of task and stimuli to assess children's understanding and use of prepositions. These include the following: Manipulating a wide variety of different objects in response to a verbal command (Bangs, 1975; Hedrick and Prather, 1975; Zimmerman, Steiner, and Evatt, 1979), using children as referents for placing objects and manipulating objects (Danzer, Gerber and Lyons, 1972) and pointing to pictures (Boehm, 1969; Dunn and Dunn, 1981; Carrow, 1986).

Generally, standardized tests assessing children's knowledge of locative prepositions have not considered task and response variables in relation to children's developmental level, as reflected by age. Information about children's performances on tasks using different stimuli and response modes related to age would be helpful in accurately assessing children's knowledge of locative prepositions and in interpreting these results.

STATEMENT OF THE PURPOSE

The purpose of this study was to examine the effect of using four different tasks to assess normal children's comprehension of five locative prepositions and relate the effects to age. Ages ranged from eighteen months to forty-eight months within six different groups. The questions this researcher sought to answer were:

Primary Question

1) Are there significant differences among various tasks for eliciting five locative prepositions?

Secondary Question

2) Do tasks vary in their effectiveness according to the age of the children?

DEFINITION OF TERMS

For the purpose of this study, the following operational definitions were used:

Assessment: process of pinpointing strengths and weaknesses (Miller, 1981).

Congruent Task: task that predisposes a particular response based on the relations between the objects involved (E. Clark, 1973).

Directional Prepositions: prepositions denoting definite or indefinite change in direction or condition (Wiig and Semel, 1976).

Fronted Object: side of an object that is prominent in some way and which does not change across time or situation (H. Clark, 1973).

Incongruent Task: task that relies on linguistic information rather than the perceptual relationships between objects involved (Wilcox and Palermo, 1975).

Locative Prepositions: preposition denoting a definite or indefinite static position or state with respect to location, quality, condition or position (Wiig and Semel, 1976).

Marked Prepositions: preposition in an antonym pair that reflects the positive member. Can also be known as a positive preposition (H. Clark, 1973).

Non-fronted Object: object that has no prominent side (H. Clark, 1973)

Semantic Features: perceptual features which define the meaning of a word and differentiate it from words that are related but not equal in meaning (E. Clark, 1973).

Task Variable: differences in input, responses, instructions, materials, order of presentation, and scoring that are involved in assessment (Miller, 1981).

Context Variable: differences in materials used to elicit responses (Miller, 1981).

Response Mode Variable: different ways of responding that are elicited by the instructions and materials (Miller, 1981).

Unmarked Preposition: preposition in an antonym pair that reflects the negative member. Can also be known as a negative preposition (H. Clark, 1973).

CHAPTER II

REVIEW OF THE LITERATURE

Assessing children's understanding and use of locative prepositions as a means of gathering information concerning normal language development has been the focus for a number of researchers. This review of the literature will present some of the current theories concerning normal children's aquisition of locative prepositions. As assessment will be the focus of this study, task variables in assessing normal children's language will be discussed, as well as task variables involved specifically in evaluating locative prepositions.

DEVELOPMENT OF COMPREHENSION OF PREPOSITIONS

Normal children appear to acquire knowledge of locative prepositions developmentally, in a generally predictible sequence, according to age. By forty-two months of age children have acquired knowledge of the following locative prepositions: "on," "under," "next to," "in front of," and "in back of" (Hedrick and Prather, 1975; E. Clark, 1980). Learning more about how children acquire knowledge of locative prepositions has interested researchers because of the relationship between conceptual, or non-linguistic knowledge, and linguistic knowledge that does not appear to be a factor in acquisition of labels for more concrete referents (Cox and Richardson, 1985). Another factor that has complicated understanding of how children acquire knowledge of locative prepositions

has been contextual characteristics involved in how this knowledge is assessed. Contextual variables such as size, shape, features and perceptual saliency of objects, speaker-listener viewpoint, and the dynamic or static properties of the interaction may all influence comprehension (E. Clark, 1980; Cox and Richardson, 1985). Consequently, several theories of acquisition have been proposed by different researchers, and three of these theories will be examined.

Complexity Hypothesis

In 1973, H. Clark proposed that a direct relationship existed between children's perceptual/conceptual knowledge of space and linguistic knowledge. The relationship between linguistic and non-linguistic information could be predictive of the order in which children acquire prepositions. Word pairs that coded a conceptual relationship (e.g., vertical axis) could be viewed as "marked"/"positive" (e.g., tall) or "unmarked/negative"(e.g., short). He felt that the word pairs were initially used interchangeably by children during the acquisition process, but the "marked" or "positive" pair would be acquired first. A number of subsequent studies have confirmed H. Clark's theory in terms of order of acquisition of prepositions (Harris and Strommen, 1972; Kuczaj and Maratsos, 1975; Washingon and Naremore, 1978), while conflicting results indicate that some "unmarked"/"negative" word pairs are acquired first, such as "in back of"(unmarked or negative) before "in front of" (marked or positive)(Abkarian, 1983).

Semantic Feature Theory

E. Clark's semantic feature approach to children's acquisition of prepositions emphasized the role of non-linguistic over linguistic

strategies (1977). She theorized that children "map" spatial relations onto various properties of objects according to their perceptual saliency and the conceptual categories to which they belong. Children use these perceptual features to form a set of semantic features attached to a lexical item and then test these hypotheses as a means to define or redefine this set of semantic features to reach an "adult" meaning. This process often results in differences in word use in different situations or "errors" (1980).

E. Clark (1973) in discussing semantic feature theory, made several predictions concerning acquisition of prepositions: 1) opposites would be confused with one another, as they are less contrastive in terms of semantic features, and 2) more complex lexical items would be acquired more slowly (1973). Later researchers have cast doubt on the assumption regarding confusion of prepositional opposites (Maratsos, 1973; Harris, Morris and Terwogt, 1986) but have supported the assumption that more complex lexical items do appear to be acquired more slowly (Levine and Carey, 1982).

E. Clark (1983) amended her semantic feature theory to include what she calls "lexical contrast theory." This theory attempts to account for the ways in which children determine differences in meaning with regard to new words. E. Clark feels that children contrast new words with known words and, subsequently, map the new words into conceptual categories that were previously unlabelled.

Extension Theory

While semantic feature theory seeks to describe how specific features define a concept, extension theory emphasizes the opposite.

Messick (1988) describes how, according to extension theory, a new concept is defined according to all its examples, particularly the "prototype" object that the child initially pairs with the concept label. All other subsequent objects are compared and contrasted with this prototype in an attempt to sort out properties that are associated with the concept. This theory addresses perceptual differences in objects that may affect comprehension and use of lexical items by differentiating them as "good" or "poor" examples depending on the specific concept (Rosch, 1978). A container would be a good prototype for a spatial term such as "in" or "under" while a block might be a poor example.

In summary, these theories regarding acquisition of relational terms all emphasize childrens' knowledge of conceptual information and the process of encoding this information onto the appropriate lexical items. Researchers differ in their explainations of specifically how new information is related to existing information and do not agree on a definite order of acquisition.

One difficulty in determining when children comprehend and use specific prepositions, and consequently, in supporting a specific acquisition theory, has been how to accurately assess this knowledge. Researchers have examined prepositions, with various studies assessing children's comprehension, production, or a combination of both comprehension and production. These researchers have demonstrated a lack of consenus regarding how comprehension and production of prepositions is best assessed. Since perceptual characteristics of stimuli appear to play such an important role in all the acquisition theories examined here, selecting appropriate stimulus materials would seem vital to any

assessment. The next two sections will discuss the role of task variables in language assessment as well as how these variables relate to assessing prepositions.

TASK VARIABLES IN ASSESSING LANGUAGE

According to Miller (1981) some important variables to consider in assessing normal children's language include the situation, the task and the child. Task variables include the following: Input mode, response mode, instructions, context, order of presentation and scoring. Input modes are usually auditory or visual in nature. Response modes can include verbal responses, pointing to pictures, manipulating objects or other motor responses. Context variables concern the materials used to elicit responses, and usually consist of pictures or objects. Selection of appropriate tasks depends on the child's developmental level in terms of linguistic, perceptual and motor abilities. Studies which have investigated task variables conclude that many variables have an effect on performance.

Researchers who have assessed locative prepositions have been particularly interested finding out more about the effects of context and response mode variables. The interest in these two variables has been generated because theorists have assumed that specialized knowledge about perceptual/spatial relationships is involved in children's understanding of locative prepositions. Context and response variables such as using two or three-dimensional materials, or tasks involving self or perspective taking could impact children's perception of these relationships. Consequently, task variables considered here will examine the differences

in performances between context (no context, pictures, and objects) and response (verbal, picture pointing, manipulating objects, and self actions).

The most common language assessment procedure used for examining task variables has been the language sample. Since there is not a single standardized procedure for eliciting language samples, researchers have used several different task conditions to determine which may elicit the longest and most complex utterances from the child.

In studies comparing task variables of context and response mode in eliciting language in normal children, there appear to be significant differences between these variables. With regard to context variables, object stimuli has been found to elicit more language in terms of length and complexity than picture stimuli in several studies (Longhurst and File, 1977; Shorr and Dale, 1984; Dong, 1986). Differences in response modes comparing self action tasks to toy manipulations tasks also resulted in differences in performance, (Kamhi, 1982) with self action tasks paired with a verbal direction more facillitative to language than manipulating objects or watching others manipulate objects. These studies have found that task variables of context and response mode do affect performance, but the majority have not considered age as as a factor. Age was compared to performance in one of these studies, but was not found to be significant in relation to task variables (Shorr and Dale, 1984). The next section will examine the relationship between task variables and assessing prepositions, and discuss this relationship with regard to age.

TASK VARIABLES IN ASSESSING PREPOSITIONS

Picture Stimuli

There have been few studies investigating the impact of using pictures as a task variable to assess how children comprehend and use locative and directional prepositions. Silliman (1979) investigated how normal children comprehended locative and directional prepositions with regard to the perceptual-spatial properties of picture stimuli. Subjects ranged from 6.5 to 11.3 years. The following locative and directional prepositions were assessed: "In front of," "in back of," "left," "right," "to the right of," "to the left of," "closer to you," "looking at you," and "pointing at you." Picture stimuli variables included 1) the conceptual perspective, or viewpoint, 2) relative distance and depth, and 3) semantic relationships. Results indicated that, in terms of the semantic relationship variable, normal children in these age groups had no difficulty identifying the pictorial representations of objects. However, there was a significant relationship between recognizing depth cues and relative distances and age. The most significant variable related to picture stimuli was in conceptual perspective or viewpoint. Here, younger children interpreted changes in viewpoint inaccurately as two-dimensional rather than three-dimensional representations. Silliman's results show that specific perceptual variables of picture stimuli do have a significant effect in assessing children's comprehension of locative and directional prepositions, according to age. Researchers investigating children's acquisition of locative and directional prepositions, however, have focused much more on object tasks to

assess this knowledge. The following studies have used objects in a variety of tasks, looking at different spatial relations, both expressively and receptively.

Object Stimuli

Since the early 1970's, researchers have examined task variables in assessing normal children's understanding and use of prepositions using a variety of objects. These objects have been considered in terms of their individual perceptual characteristics, characteristics in relation to each other, and the nature of tasks in which they are used. Studies have assessed different locative and directional prepositions in a variety of age groups in an attempt to gather information about age and nature of acquisition of these prepositions in normal children. Consequently, information concerning task variables involved in assessing locative and directional prepositions is most commonly related to children's age.

A 1979 study by Johnston and Slobin examined normal children's expressive use of locative prepositions comparing "featured" objects with "non-featured" objects as stimuli. Featured objects were those with a recognizable "front" or "back" such as a truck or a television set. Non-featured objects were "frontless" or "backless" with no recognizable front/back features, such as a tree or a ball. These children, aged 2.0 to 4.8, consisted of four different groups speaking four languages: English, Italian, Serbo-Croatian, and Turkish, and were assessed in terms of their ability to label the following locative prepositions: "in," "on," "under," "beside," "between," "back," and "front." These researchers found that, regardless of what language they spoke, all children expressed the prepositions "back" and "front" more accurately

with featured objects than with non-featured objects, and expressed an increasingly greater number of correct locative prepositions according to age. Consequently, specific perceptual characteristics of objects appear to be significant in assessing locative prepositions, according to age level.

In a 1972 study by Harris and Strommen, two different object manipulation tasks involving featured and non-featured objects were used to assess comprehension of the locative prepositions "back," "front" and "beside." These normal children ranged from 4.9 years to 7.5 years of age. The tasks involved two parts. In the first part, an object manipulation task, the examiner presented a featured object (e.g., doll) for the child to use as a referent for placing his own object. Another trial used the same procedure, but using a non-featured referent object (e.g., block). In the second task, object manipulation, the child used his own body as a referent for placing another object. Results of the different stimulus conditions were similar to those obtained by Johnston and Slobin (1979) and showed that the task with the featured object elicited more correct responses than the task using non-featured objects. However, there were no significant differences in performances on different tasks, according to age group, as was evident in the previous study. The self-referent task elicited the highest number of correct responses. In fact, every child in the study responded correctly to every self-referent task, indicating that knowledge of "frontness" and "backness" in self may not reflect knowledge of that concept in other contexts. Harris and Strommen (1972) conclude that how locative prepositions are evaluated directly effect the results that are obtained.

In a 1975 study by Kuczaj and Maratsos a group of children, aged 2.6 to 4.0 years, were assessed using object stimuli across different tasks to determine their comprehension of the following locative prepositions: "front," "back," and "side." The tasks included 1) the "self-referent task," 2) the "touch task," 3) the "fronted-objects placement task," 4) the "non-fronted objects placement task," and 5) the "generalization task." These tasks consisted of 1) placing self in relation to objects with identifiable fronts (fronted), 2) identifying fronts and backs of objects with clearly identifiable fronts (e.g., car) and those without clearly identifiable fronts (e.g., block), 3) manipulating objects that have identifiable fronts (fronted), 4) manipulating objects that do not have clearly identifiable fronts (non-fronted), and 5) identifying front and backs of large objects with (fronted) and without (non-fronted) clearly identifiable fronts. Results confirmed those of Harris and Strommen (1972) indicating that children performed significantly better on the task involving placement of themselves as referents. Performance on other tasks were in the following order: Tasks involving manipulating and touching fronted objects, tasks involving child-sized objects, and tasks involving manipulating and touching non-fronted objects. With regard to age, results differed from Harris and Strommen (1972) but confirmed those of Johnston and Slobin (1979). Older children performed better on all tasks as compared to younger children and this difference was greater for some tasks than others.

These results would again indicate that perceptual properties of objects used in the task (e.g., fronted/non-fronted) play a role in children's performances, in addition to the task itself, and that

children's age may also be significant.

Other researchers have also investigated perceptual properties of objects used to assess understanding of locative prepositions. Wilcox and Palermo (1975) used the terms "contextually congruent" and "contextually incongruent" to describe different stimulus conditions used to assess the locative prepositions "in," "on," and "under." Contextually congruent tasks were those that "made sense" with regard to the objects involved in the task (e.g., putting a teapot on a table). Contextually incongruent tasks were those that did not "fit" with the objects involved in the tasks (e.g., putting the teapot in the table). In normal subjects aged 1.6 to 2.11, Wilcox and Palermo found significant differences between subject's age and congruency and between age and the specific stimulus object pair that was used. Younger children performed better on incongruent tasks while older children performed better on congruent tasks, and some objects elicited more correct responses than others. An error analysis indicated that children tended to make two kind of errors: 1) Placing an object in the most congruent contextual relationship and, 2) tendency to make the simplest motor response. These results are similar to those obtained in other studies in terms of the importance of considering perceptual variables in objects selected to assess locative prepositions.

Recently, researchers have investigated using objects in more naturalistic contexts to assess children's comprehension and use of locative prepositions. Levine and Carey (1982) sought to investigate if the concept of "front" and "back" preceeded acquisition of the word, or if the word preceeded the concept. They gave 2 to 3 year old children

the object manipulation task of lining toys up in a "parade," and arranging toys for a "conversation" to assess their non-linguistic knowledge of the locative prepositions. Pointing to the fronts and backs of various objects was a task used to assess linguistic knowledge of the locative prepositions. The toys used in the first task were all "fronted" while those used in the third task were both "fronted" and "non-fronted." The results of their research indicated that there were no significant differences in performance on the linguistic task (task three) compared to the non-linguistic tasks (tasks one and two). Age was not considered as a factor in this experiment. This data does not support previously discussed research regarding fronted and non-fronted objects, as there was not a difference in children's performances between tasks.

In another effort to explore using more naturalistic contexts to elicit locative prepositions, Johnston (1984) used a puppet show format to evaluate children's expression of the following locative prepositions: "In," "on," "under," "beside," "behind," and "in front of." Johnston also used larger stimulus materials to see if size of objects had any effect on performance. Results of this study confirmed earlier studies related to sequence of locative prepositions according to age. The puppet elicitation method was found to be more effective in eliciting the desired locative prepositions at younger ages than previous studies using "Where" questions. Using larger non-fronted objects resulted in children using "behind" more frequently than when smaller objects were used. The order of acquisition was influenced by the "fronted/featured" or "non-fronted/nonfeatured" characteristics of the objects as illustrated by the

following order of acquisition: "On," "in," "under," "next to," "back-"(taller), "back"(featured), "front"(featured), "back"(non-featured), "front"(taller), "front"(non-featured).

Picture and Object Stimuli

Ault, Cromer and Mitchel (1977) devised a "three-dimensional" version of the Boehm Test of Basic Concepts (Boehm, 1969) to determine if three dimensional object stimuli would have an effect on children's comprehension of a variety of different prepositions, including some locative prepositions, as compared to the traditional picture stimuli. In this group of normal children, mean age 5 years, there were no significant differences between the object stimuli and picture stimuli conditions. Researchers felt that subjects either knew the concepts evaluated or did not know them, regardless of the stimuli used. They proposed that the Boehm Test of Basic Concepts may assess a level of cognitive development at which the dimensionality of the stimuli is not important.

In a 1978 study by Washington and Naremore, children's comprehension and use of locative and directional prepositions was assessed by using pictures and objects. Subjects were normal children aged 3.0 to 4.11 years. The stimuli used to assess nine locative and directional prepositions included small objects, life-sized objects and black and white drawings. Prepositions were elicited expressively by the examiner placing objects or drawing a dot on a particular picture and then asking the child to identify the location. Prepositions were elicited receptively by asking children to place objects relative to other objects, or to make dots in relation to pictures of objects, in response to a

direction. Results indicated that older children performed better than younger children and the type of task significantly effected performance according to age. Three-dimensional tasks resulted in increased performance for younger children, compared to two-dimensional picture tasks. Washington and Naremore speculate that two-dimensional representations are not adequate to assess young children's comprehension and use of locative and directional prepositions.

While these studies emphasize the impact that assessment variables play in accurately evaluating children's comprehension and use of locative prepositions, research is lacking in several areas. Researchers have not thoroughly examined the effect of using both object and picture stimuli across different tasks to assess comprehension locative prepositions, particularly in younger children. A need exists to compare these variables as they relate to children's performance in an effort to gather more information about their significance, as well as to determine how young children acquire knowledge and use of spatial terms.

CHAPTER III

METHODS AND PROCEDURES

METHODS

Subjects

Sixty children were selected from private day care centers, child development centers, and private homes within the Portland, Oregon metropolitan area on the basis of chronological age, normal language development and normal hearing acuity. Ten children in each of the six following age groups were included in the study: Eighteen months, twenty-four months, thirty months, thirty-six months, forty-two months and forty-eight months.

Children's chronological ages were obtained from office and parent records. Those considered for the study were within plus or minus sixty days of being in one of the six age groups at the time of testing.

Screening

Parent permission forms were sent to the homes of those children who met age requirements (Appendix A). Those children who had returned, signed permission forms were screened by the investigator. Screening consisted of administering the Denver Developmental Screening Test (DDST) (Frankenberg, Dodds and Fandal, 1975) (Appendix B) and a hearing screening to determine if language and hearing were within normal limits. Children were included in the study if they met age level criterion for both the DDST (1975) and the hearing screening schedule developed at the

Crippled Children's Division and Child Development and Rehabilitation Center (CCD/CDRC) University of Oregon Health Sciences University (UOHSU), Portland, Oregon (Appendix C).

Information concerning children's socioeconomic status was obtained by a parent answering questions about their occupation and educational level on the parent permission form. Working Paper Number Fifteen, U. S. Bureau of the Census, (1963) was used to determine each child's socio-economic status. This information was used in interpreting results rather than in selecting subjects.

Instruments

Hearing Screening. The hearing screening schedule developed at the CCD/CDRC UOHSU (Appendix C) was used to assess the hearing acuity of the subjects in this study. Noisemakers and verbal directions in a sound field were used to elicit responses in children aged eight months to two years. A pure tone audiometric screening was administered bilaterally at .5, 1, 2, and 4KHz at 25 dB to assess hearing in children aged three years and older. The Beltone portable audiometer, model 10-D, and TDH-39 air receivers with MX-4/AR cushions were used for these pure tone screenings.

Developmental Screening. The Denver Developmental Screening Test (Frankenberg et al., 1975) is a screening instrument to assess children's personal-social, fine motor, language and gross motor skills from birth to six years of age, designed to detect developmental impairment.

Preposition Assessment. The investigator-developed Test for Comprehension of Five Locative Prepositions (Appendix D) was used to assess children's comprehension of the following locative prepositions:

"on," "under," "next to," "in front of," and "in back of." Six common objects and photographs of the objects were used to elicit these locative prepositions receptively. Locative prepositions tested were those which normal children comprehend by four years of age (Bangs, 1979). Test items were similar to those used in the Vocabulary Comprehension Scale (Bangs, 1975), The Bohem Test of Basic Concepts (Boehm, 1969), and the Daberon (Danzer, Gerber and Lyons, 1972).

Each locative preposition was assessed using four different tasks requiring four different response modes: Acting out directions, manipulating objects, pointing to objects, and pointing to pictures. Materials consisted of photographs, child-sized objects, and toys and included the following: A child-sized table, a child-sized chair, a child-sized truck, toy tables, toy people, toy trucks, toy chairs, and photographs of these objects. Photographs were 3 x 5 inch color pictures of the toy objects used in the other tasks, taken by the examiner. Objects were selected on the basis of possessing a number of logical relationships (e.g., truck and person) rather than a single or obvious relationship (e.g., block and cup)(E. Clark, 1977). Both "fronted" (people, trucks, and chairs) and "non-fronted" (tables) were used as referents for tasks.

PROCEDURES

Screening

The examiner administered the DDST and a hearing screening to children with signed, returned parent permission forms (Appendix A). Information obtained on the permission form was used to complete portions of the DDST. Testing was conducted in a quiet room of children's home or

school on an individual basis, with no other adults present.

Sixty children who passed age level criterion for language and hearing were included in the study, while seven children did not pass screening criterion and were not included in the study.

Administration of the Test for Comprehension of Five Locative Prepositions

Each child who met screening criteria was presented with all twenty test items individually by this investigator in a quiet room of their home or school. To introduce the assessment, the examiner sat next to the child and said, "I have some toys to play with. Let's look at them and I'll say their names." After the examiner named all the objects, she gave each child the following instructions: "I want you to look at these toys and pictures with me, and do some things with them." After the child had an opportunity to examine the materials and the researcher had named all the objects, the examiner began presenting the twenty stimulus sentences of the Test for Comprehension of Five Locative Prepositions.

The four different tasks and five prepositions within the Test for Comprehension of Five Locative Prepositions were administered in a rotated order of presentation according to a sequence constructed by the examiner (Appendix E). When each parent permission form was returned, the subject was assigned to one of the task-preposition sequences. For example, subject one was assigned to task-preposition sequence 1, subject two to task-preposition sequence 2, and so on, repeating the sequence every sixteenth subject.

To administer the Test for Comprehension of Five Locative Prepositions, the examiner said twenty stimulus sentences, one for each of the

five prepositions across four different tasks. These directions were given using the carrier phrase "Show me (preposition)." In all tasks, the examiner gave the stimulus sentence twice during each trial. If the child did not respond, had a puzzled look on their face, or asked "What?," the examiner repeated the stimulus sentence a third time. If the subject did not respond after the third time, a score of "no response" was recorded for that particular item. There were many "no response" scores recorded for the subjects in this study.

For Task I, performing an action in response to a direction, the examiner asked the child to perform actions involving each of the five prepositions. The examiner said a stimulus sentence (e.g., "Show me 'under'") to elicit a response of the child placing themself in relation to the chair or table.

For Task II, manipulating objects in response to a direction, three objects were simultaneously placed on the table in front of the child. The examiner then gave the child a direction (e.g., "Show me 'under'") to elicit a response of placing a object in relation to another object.

For Task III, the child identifying groups of stationary objects in response to a direction, the researcher presented three groups of toys similar to those in Task II, that were placed in stationary positions. The researcher then gave the child a direction (e.g., "Show me 'under'") to elicit a response of the child pointing to one of the arrays.

For Task IV, the child identifying a photograph in response to the examiner's directions, photographs in this task represented objects used in Tasks II and III. The examiner simultaneously presented three photographs showing objects in different positions. The examiner then

gave the child a direction (e.g., "Show me 'under'") to elicit a picture pointing response.

Scoring

The examiner scored test items by giving one point for each correct response and no points for each incorrect response or lack of response, with twenty total points possible. Responses were judged "correct" if the child performed the requested action accurately, as determined by test response criteria. Children's correct responses on the second trial of any item were scored the same as first trial responses.

Data Analysis

Data for each age group was tabled according to age group, task, and preposition. An Analysis of Variance with a Three-Factor Mixed Design with Repeated Measures on Two Factors was used to compare these variables. Two-tailed *t*-Tests were used to further analyze the effect of task variables on age.

CHAPTER IV

RESULTS AND DISCUSSION

RESULTS

The purpose of this study was to examine the effect of using four different tasks to assess normal children's comprehension of five locative prepositions and relate the effects to age. The questions this researcher sought to answer were:

Are there significant differences among various tasks for eliciting five locative prepositions and, if so, do tasks vary in their effectiveness according to the age of the children?

Sixty normal children within six age groups ranging from eighteen to forty-eight months were tested for comprehension of five locative prepositions using four different tasks.

To obtain an overview, raw data (Appendix E) was analyzed for the effects of age, task and preposition (Table I). This three-way analysis of variance (ANOVA) design, age (6) X task (4) X preposition (5), resulted in significant main effects for age ($F=40.58$, d.f.=5, $P < .001$), task ($F=16.62$, d.f.=3, $P < .001$), and preposition ($F=49.04$, d.f.=4, $P < .001$). In comparing interactions of these variables, other significant results were obtained. The age by task interaction was significant ($F=1.91$, d.f. 15, $P < .05$), as was the age by preposition ($F=3.44$, d.f. 20, $P < .001$), task by preposition ($F=5.92$, d.f. 12, $P < .001$), and the age by task by preposition interaction ($F=1.53$, d.f. 60, $P < .001$).

TABLE I

SUMMARY OF ANALYSIS OF VARIANCE

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F	P
Total	295.68	1199			
Between Subjects	112.68	59			
Age	87.63	5	17.526	40.5792	.001
Error B	29.05	58	.4318		
Within Sub	183.00	1140			
Task	7.75	3	2.5844	16.6208	.001
Preposition	22.84	4	5.7095	49.0364	.001
Age x Task	4.46	15	.2971	1.9107	.05
Age x Prep	8.01	20	.4005	3.4404	.001
Task x Prep	7.86	12	.6546	5.9234	.001
Age x Task x Preposition	10.13	60	.1689	1.5285	.001
Error 1	25.19	162	.1554		
Error 2	25.15	216	.1164		
Error 3	71.63	648	.1105		
TOTAL	887.04	3601			

COMPARISONS BETWEEN AGE AND TASK

Although this global analysis of data indicated significant differences for all variables, the primary focus of the study concerned the

interaction of age and task. Subsequently, two-tailed t-tests were used to analyze the statistical significance of the interactions between age and task and compare tasks as they related to one another.

TABLE II

MEANS, STANDARD DEVIATIONS AND t-TEST VALUES RESULTING FROM TASK COMPARISONS FOR ALL AGE GROUPS

TASK	MEAN	SD	t-TEST VALUES	SIGNIFICANCE LEVEL
1	3.03	1.79	-1.57	p<.10
2	3.27	1.47		
1*	3.06	1.79	3.53	p<.001**
3	2.43	1.87		
1*	3.06	1.79	4.00	p<.001**
4	2.40	1.80		
2*	3.31	1.46	5.79	p<.001**
3	2.43	1.87		
2*	3.31	1.46	5.38	p<.001**
4	2.40	1.80		
3	2.43	1.87	2.87	p<.20
4	2.40	1.80		

*Task in dyad eliciting most correct prepositions
**Significant

Overall Sample

Comparisons between each task across all six age groups indicated significant differences on four of the interactions, and no significant differences on two interactions. These results, including means and standard deviations, are contained in Table II. Highly significant differences (p<.001) were obtained between Task I (self actions) and Task

III (stationary objects)(t-value 3.53) with Task I eliciting more correct responses. Other comparisons that were highly significant ($p<.001$) were obtained between Task I (self actions) and Task IV (pictures) with a t-value of 4.00, Task II (manipulating objects) and Task III (stationary objects) with a t-value of 5.79, and Task II (manipulating objects) and Task IV (pictures) with a t-value of 5.61. Task I (self actions) elicited more correct responses than Task IV (pictures), Task II (manipulating objects) elicited more correct responses than Task III (stationary objects), and Task II (manipulating objects) also elicited more correct responses than Task IV (pictures).

Task interactions that were not significant ($p<.10$ and $p<.20$) for all age groups included Task I (self actions) and Task II (manipulating objects) which resulted in a t-value of - 1.57 and Task III (stationary objects) and Task IV pictures) with a t-value of .28.

Comparisons by Age Group

Since the secondary focus of this investigation was to consider the effect of varying tasks on the performance of specific age groups, each of the six age groups were examined for significant task interactions within these age groups, using two-tailed t-tests.

Group I. In group I (mean age 18.6 months) (Table III) five out of a possible six task interactions were significant, according to the number of correct locative prepositions they elicited. Results obtained on Task I (self actions) were significant (4.74, $p<.01$) in comparison to Task II (manipulating objects) and Task IV (pictures) (2.71, $p<.05$), but not significant ($p<.20$) in comparison to Task III (stationary objects)(1-.51).

TABLE III

MEANS, STANDARD DEVIATIONS AND t-TEST VALUES
RESULTING FROM TASK COMPARISONS
FOR AGE GROUP I

TASK	MEAN	SD	t-TEST VALUES	SIGNIFICANCE LEVEL
1	.60	.69	-4.74	p<.01**
2*	1.60	.69		
1	.60	.69	1.49	p<.20
3	.40	.51		
1*	.60	.69	2.71	p<.05**
4	0	0		
2*	1.60	.69	5.99	p<.001**
3	.40	.51		
2*	1.60	.69	7.23	p<.001**
4	0	0		
3*	.51	.40	2.44	p<.05**
4	0	0		

*Task in dyad eliciting most correct prepositions
**Significant

There were highly significant (p<.001) interactions between Task II (manipulating objects) and Task III (stationary objects), and Task II (manipulating objects) and Task IV (pictures) with t-values of 5.99 and 7.23, respectively.

There were less significant (p<.05) differences between Task III (stationary objects) and Task IV (pictures) which yielded a t-value of 2.44. Within these dyads, Task II (manipulating objects) elicited more correct responses than Task I (self actions), while Task I (self actions) was more successful in eliciting correct prepositions than Task IV (pic-

tures). Task II (manipulating objects) elicited more correct responses than either Task III (manipulating objects) or Task IV (pictures). Task III (stationary objects) was superior to Task IV in eliciting correct responses.

TABLE IV

MEANS, STANDARD DEVIATIONS AND t-TEST VALUES RESULTING FROM TASK COMPARISONS FOR AGE GROUP II

TASK	MEAN	SD	t-TEST VALUES	SIGNIFICANCE LEVEL
1	2.90	1.72	1.48	p<.20
2	2.20	1.22		
1*	2.90	1.72	3.36	p<.01**
3	1.30	1.56		
1	2.90	1.72	2.14	p<.10
4	1.50	1.84		
2	2.20	1.22	2.25	p<.10
3	1.30	1.56		
2	2.20	1.22	1.35	p<.20
4	1.50	1.84		
3	1.30	1.56	-.39	p<.20
4	1.50	1.84		

*Task in dyad eliciting most correct prepositions
**Significant

Group II. In Group II (mean age 24.4 months) results comparing different tasks (Table IV) were significant in one task dyad. Task I (self actions) and Task III (stationary objects) interactions were significant (p<.01) with a t-value of 3.36, with Task I (self actions) eliciting more correct responses than Task III (stationary objects).

Group III. In Group III (mean age 30.7 months) results (Table V) in two task dyads yielded significant differences, while four others were not significant.

Task I (self actions) and Task III (stationary objects) were significantly different ($p<.05$) with a t-value of 2.51, and Task II

TABLE V

MEANS, STANDARD DEVIATIONS AND t-TEST VALUES RESULTING FROM TASK COMPARISONS FOR AGE GROUP III

TASK	MEAN	SD	t-TEST VALUES	SIGNIFICANCE LEVEL
1	3.00	1.49	.45	$p<.20$
2	2.80	.63		
1*	3.00	1.49	2.51	$p<.05$**
3	1.70	1.15		
1	3.00	1.49	1.90	$p<.10$
4	2.30	1.15		
2*	2.80	.63	2.90	$p<.02$**
3	1.70	1.15		
2	2.80	.63	1.24	$p<.20$
4	2.30	1.15		
3	1.70	1.15	1.26	$p<.20$
4	2.30	1.15		

*Task in dyad eliciting most correct prepositions
**Significant

(manipulating objects) and Task III (stationary objects) were also significantly different ($p<.02$) with a t-value of 2.90. Task I (self actions) elicited more correct prepositions than Task III (stationary objects), and Task II (manipulating objects) was superior to Task III

(stationary objects) in eliciting correct responses.

Group IV. The results from subjects in Group IV (mean age 36.8 months) (Table VI) indicated significant differences in scores elicited by two of the tasks, but no significant differences on the other four

TABLE VI

MEANS, STANDARD DEVIATIONS AND t-TEST VALUES RESULTING FROM TASK COMPARISONS FOR AGE GROUP IV

TASK	MEAN	SD	t-TEST VALUE	SIGNIFICANCE LEVEL
1	2.60	1.26	-3.34	p<.01**
2*	3.80	1.03		
1	2.60	1.26	.26	p<.20
3	2.50	1.08		
1	2.60	1.26	.75	p<.20
4	2.30	.82		
2*	3.80	1.03	3.88	p<.01**
3	2.50	1.08		
2*	3.80	1.03	3.73	p<.01**
4	2.30	.82		
3	2.50	1.08	.42	p<.20
4	2.30	.82		

*Task in dyad eliciting more correct prepositions
**Significant

task interactions. There were significant differences (p<.01) between each of the next three dyads: Task I (self actions) and Task II (manipulating objects), Task II (manipulating objects) and Task III (stationary objects), and Task II (manipulating objects) and Task IV (pictures), with t-values of -3.34, 3.88, and 3.73, respectively.

TABLE VII

MEANS, STANDARD DEVIATIONS AND t-TEST VALUES RESULTING FROM TASK COMPARISONS FOR AGE GROUP V

TASK	MEAN	SD	t-TEST VALUE	SIGNIFICANCE LEVEL
1	4.70	.67	-.31	p<.20
2	4.80	.63		
1	4.70	.67	1.96	p<.10
3	4.10	1.10		
1*	4.70	.67	2.44	p<.05**
4	4.30	.82		
2	4.80	.63	1.56	p<.20
3	4.10	1.10		
2	4.80	.63	1.62	p<.20
4	4.30	.82		
3	4.10	1.10	-.51	p<.20
4	4.30	.82		

*Task in dyad eliciting the most correct prepositions
**Significant

Task II (manipulating objects) was superior in eliciting correct response to the other three tasks, including Task I (self actions), Task II (manipulating objects), and Task IV (pictures).

Group V. Results from Group V (mean age 42 months) (Table VII) indicate that there were significant differences in performance in only one task comparison and no significant differences in the other five dyads. Significant differences ($p<.05$) between Task I (self actions) and Task IV (pictures), resulted in a t-value of 2.44, with Task I eliciting more correct responses than Task IV.

TABLE VIII

MEANS, STANDARD DEVIATIONS AND t-TEST VALUES
RESULTING FROM TASK COMPARISONS
FOR AGE GROUP VI

TASK	MEAN	SD	t-TEST VALUE	SIGNIFICANCE LEVEL
1	4.60	.84	-.99	p<.20
2	4.70	.67		
1	4.60	.84	0	n.s.
3	4.60	1.26		
1	4.60	.84	1.35	p<.20
4	3.90	.99		
2	4.70	.67	.20	p<.20
3	4.60	1.26		
2	4.70	.67	1.71	p<.20
4	3.90	.99		
3	4.60	1.26	1.65	p<.20
4	3.90	.99		

Group VI. The results obtained from Group VI (mean age 47.9 months) (Table VIII) indicate that no task was significantly better than another in eliciting correct responses.

DISCUSSION

The findings in this study indicate that significant differences do exist among various tasks used to elicit five locative prepositions, and that tasks varied in their effectiveness, according to the age of the children. Across all age groups, Task I (self actions) and Task II (manipulating objects) elicited significantly more correct locative

prepositions than stationary object or picture tasks. There was not a significant difference between Tasks I and II in the number of correct locative prepositions they elicited.

These results differ with researchers (Harris and Strommen, 1972; Kuczaj and Maratsos, 1975) who found that children, ranging in age from 2.6 to 7.5, performed better on tasks that used their bodies as referents than tasks using objects as referents. However, research supports the finding of significantly better performance on object manipulation tasks as compared to picture tasks (Washington and Naremore, 1978).

In addition to significant differences between tasks across all age groups, there were also significant differences between age groups regarding the task eliciting the most correct locative prepositions.

In the youngest subjects (mean age 18.6 months) the type of task used to elicit prepositions appeared to have a greater impact on performance than in the oldest age group (mean age 47.9 months). The younger group had four significant task interactions, with Task II (manipulating objects) eliciting significantly more correct locative prepositions than any other task. Within this age group, degree of interest in the activity and pointing behavior appeared to influence results. Manipulating objects was the activity of choice for children in this age group, in terms of wanting to participate in it above all others. Children in group I did show some interest in the stationary object and picture tasks, but this was primarily in the form of pulling objects off the arrays and turning pages, with little response in relation to a direction.

In contrast, there were no significant task interactions in the

oldest group (mean age 47.9 months), indicating that the type of task and stimuli used did not appear to relate to increased comprehension. These findings agree with others who have found no differences in performance when assessing older (mean age 5.0 years) children's comprehension of locative prepositions using picture and object manipulation tasks (Ault, Cromer and Mitchel, 1977). However, in looking at the task that elicited the most correct prepositions, it was the object manipulation task that was also the most successful for this age group.

In examining the other age groups, differences between tasks are more varied. In age group II (mean age 24.4 months) there was only one significant task interaction, where self actions appeared to elicit more correct responses than identifying stationary objects. Consequently, type of task did not appear to make as much of a difference in these children as compared to age group I. Age group III (mean age 30.7 months) results were most similar to the age group II, but with two task interactions that were significantly different. These differences indicated that, as in age group II, the stationary objects task (Task III) was not as effective in eliciting correct responses as the other tasks, but no other task was significantly superior to the other in eliciting the most correct prepositions.

In contrast, results from age group IV (mean age 36.8 months) are most similar to age group I, with manipulating objects eliciting significantly more correct responses than any other task, even the self actions task. These results may be influenced by what Wilcox and Palermo (1975) call "congruency" or "incongruency" of tasks used to assess locative prepositions. They found that younger children often perform

better on incongruent tasks that do not make sense with regard to the situation, while older children perform better on congruent tasks that do fit with the situation. In the self actions task, while the table and chair stimuli and response modes were contextually congruent, the truck stimuli and response mode was not particularly appropriate to the context, which may have accounted for these childrens' differences in performances on this particular task. Another factor which may have influenced performances on the self actions task was children's reluctance to perform whole-body tasks with an unfamiliar adult. Many subjects found sitting at a table doing structured tasks more comfortable than performing gross motor tasks. Several older children, including some within this age group, refused to do the self actions tasks, perhaps due to lack of familiarity with the adult and the situation.

Other researchers assessing comprehension of locative prepositions identified a common error subjects make as the tendency to make the simplest motor response (Wilcox and Palermo, 1975). This error was observed in all age groups, but particularly in younger age groups, with children consistently selecting the bottom picture in the picture task, perhaps because it was the closest picture of the three-picture array. A general lack of "reflectivity" (Shorr and Dale, 1984) was noted in children in age groups I through II and in a few subjects in group IV and V, indicating that impulsivity in choosing pictures or stationary object arrays may have affected correct responses.

Age group V (mean age 42 months) results were similar to the younger age groups, in that there were significant differences between tasks (self actions task as compared to the picture task), but also comparable

to the older age group since the object manipulation task elicited the most correct prepositions.

In summary, these results indicate that object manipulation and self action tasks elicited more correct locative prepositions than stationary object or picture tasks across all six age groups. Within each age group, there were significant differences between tasks that elicited correct prepositions in children aged eighteen to forty-two months, while there were no significant differences among tasks in four year old children.

COMPARISONS BETWEEN SUBJECTS

For the purposes of examining group and individual performances, ranges, means and standard deviations for each of the six age groups were compared (Table IX and Figure 1).

For age group I (mean age 18.6 months) the mean of correct prepositions across all four tasks was 2.60, with a standard deviation of 1.60 and a range of 1-6. In age group II (mean age 24.4 months) the mean increased to 7.90 with a standard deviation of 5.15 and a range of 2-19. In age group III (mean age 30.7 months) the mean number of correct prepositions also increased to 9.89, with a standard deviation of 2.23 and a range of 7-16. For age group IV, (mean age 36.8 months) the mean number of correct prepositions increased to 11.20 with a standard deviation of 2.97 and a range of 6-15. In age group V, (mean age 42 months) the mean number of correct prepositions increased to 17.90, with a standard deviation of 2.07 and a mean range of 14-20. In age group VI, (mean age 47.9 months) the mean number of correct prepositions decreased

TABLE IX

RANGES, MEANS AND STANDARD DEVIATIONS
OF FIVE LOCATIVE PREPOSITIONS

Age Group	N	Range	Mean	Standard Deviation
1	10	1-6	2.60	1.60
2	10	2-19	7.90	5.15
3	10	7-16	9.89	2.23
4	10	6-15	11.20	2.97
5	10	14-20	17.90	2.07
6	10	14-20	17.80	1.81
Total	60	1-20	11.20	5.45

slightly to 17.80, with a standard deviation of 1.81 and a range of 14-20. Across all age groups, the mean number of correct prepositions was 11.20, with a standard deviation of 5.45 and a range of 1-20.

As indicated by the mean scores, comprehension of these five locative prepositions show a pattern of increasing comprehension according to age, but with a great deal of variance among subjects within some age groups, as indicated by the ranges.

Ranges from age groups I, V, and VI show that there was less variability among subjects in these groups. Most subjects in age group I did not comprehend a large number of prepositions, while most subjects in age groups V and VI did comprehend more prepositions.

Ranges from age groups II, III, and IV, show much more variation

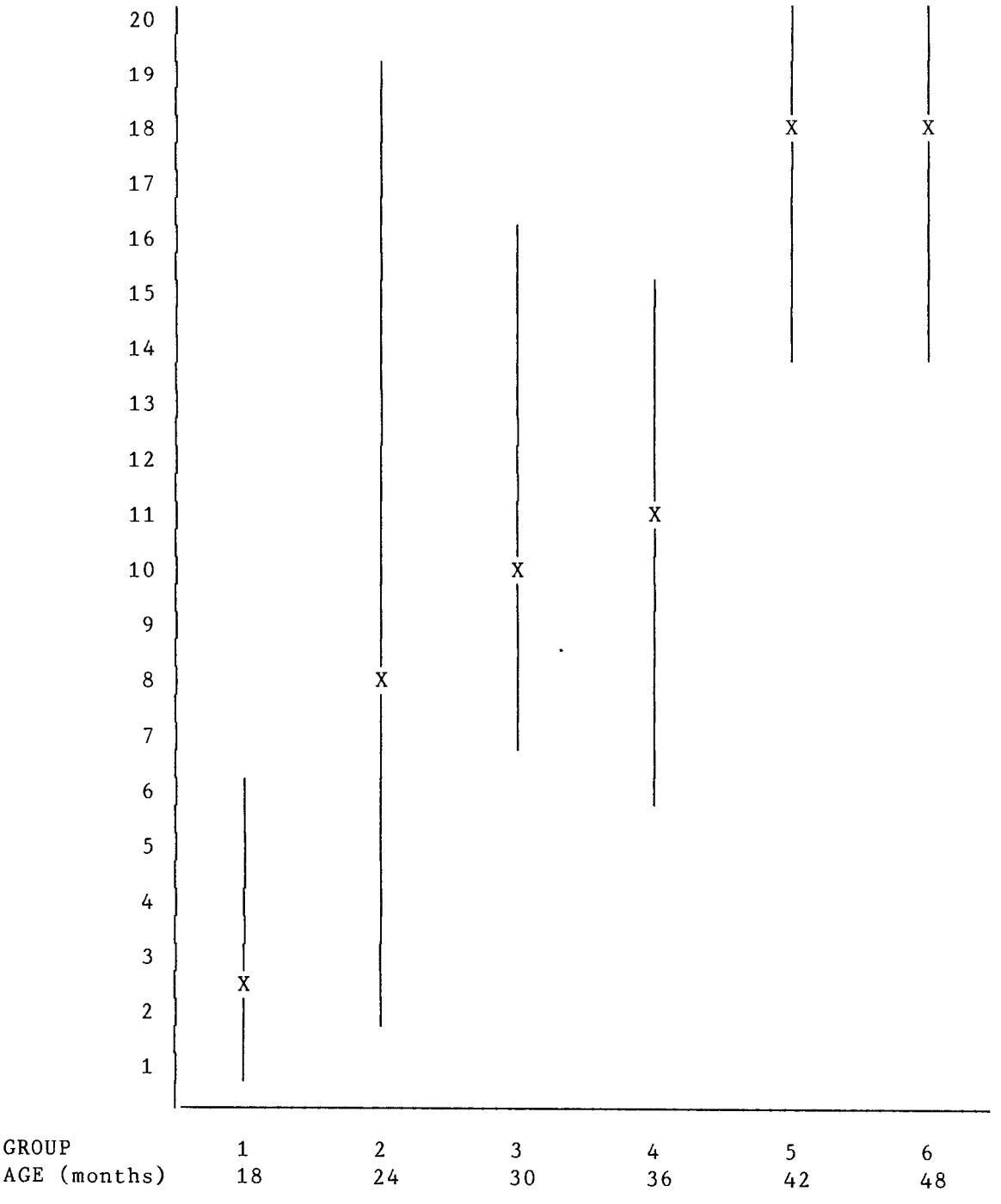

Figure 1. Ranges and means of five locative prepositions in sixty children in six age groups from eighteen to forty-eight

between individual subjects' scores, with ranges of 2-19 in group II, 7-16 in group III, and 6-15 for group IV.

In examining individual subjects' performances in group II, the group with the greatest variability among subjects, the highest scores resulted from a child with the oldest age within this group, while the lowest score was made by a subject from the lower range of the age group. Other scores within the age group followed a pattern of increasing correct responses with increasing age, suggesting that age differences may have been a factor in the wide range of scores, and that these differences might have more impact on this particular groups' performances.

In groups III and IV, there did not appear to be a pattern of increasing correct responses with age. Subjects who comprehended the highest and lowest number of correct prepositions were the same ages, indicating that differences in individual subjects' abilities may have resulted in differences in performance.

In summary, subjects in the youngest and two oldest age groups showed less variability in their comprehension of locative prepositions. Differences between subjects in age group II appeared to be related to age, while differences between subjects in groups III and IV may be related to individual subjects' abilities.

CHAPTER V

SUMMARY AND IMPLICATIONS

SUMMARY

Assessing children's knowledge of locative prepositions has been a focus of interest for both researchers and practicing clinicians over the past two decades (Boehm, 1969; E. Clark, 1973). Information about locative prepositions can give insight into how children acquire understanding of these relationships, as well as providing information about assessing and facillitating this understanding in both normal and language disordered children. Speech-language pathologists routinely assess normal and language disordered children's understanding and use of locative prepositions, since these relationships are so frequently occurring in our language and appear to have value across different communicative contexts (Zyve, 1927; Lahey and Bloom, 1977).

A recurring concern in recent research appears to be the role that assessment variables play in accurately measuring children's knowledge and use of prepositions. Age and order of acquisition of prepositions has become a dynamic rather than static standard, as different ways of assessing prepositions also give different results (Johnston and Slobin, 1979; E. Clark, 1981; Johnston, 1984). These researchers have investigated assessment variables such as context (picture, object, no context) and response (self actions, manipulating, pointing) in assessing normal children's understanding and use of prepositions (Harris and

Strommen, 1972; Kuczaj and Maratsos, 1975; Wilcox and Palermo, 1975; Silliman, 1979; Levine and Carey, 1982). Most have considered these variables separately, but a few have contrasted a limited number of variables with significant results for some age groups (Ault, Cromer and Mitchel, 1977; Washington and Naremore, 1978). Contrasting a number of these assessment variables across a wider age range could give more information about how normal children understand locative prepositions, and how to best assess this knowledge.

The questions posed in this study were: Are there significant differences among various tasks for eliciting five locative prepositions, and, if so, do tasks vary in their effectiveness according to the age of the children?

Sixty children, ten within each of six age groups, aged eighteen to forty-eight months, participated in the study. All the children had normal language and hearing abilities. An investigator-developed assessment, the Test for Comprehension of Five Locative Prepositions, was administered to each child by the investigator. The Test for Comprehension of Five Locative Prepositions involved picture contexts and object contexts of varying sizes, and required manipulation, pointing and self action response modes.

Raw scores from the assessment were compared using a three-way Analysis of Variance (age x task x preposition) to determine if significant differences existed between age and task variables. Two-tailed *t*-Test values were also computed to determine if statistically significant differences between tasks existed.

Results of the Analysis of Variance indicated that statistically

significant differences existed between age and task. t-Test results also indicated significant differences between tasks across all age groups and within some age groups. Tasks involving 1) manipulating objects (Task II), and 2) self actions (Task I) elicited significantly more correct prepositions in all children. There were significant differences among tasks in the number of correct locative prepositions that they elicited in children aged eighteen months to forty-two months, but no significant differences between tasks in the forty-eight month age group.

IMPLICATIONS

Clincal Implications

These results support existing data indicating that assessment variables and normal children's understanding of prepositions have a significant relationship with age. Tasks involving object manipulation (Task II) and self actions (Task I) elicited more correct prepositions in all children, across age groups. In children aged eighteen months to forty-two months, there were significant differences among tasks eliciting the most correct prepositions, while there were no significant differences among tasks in children aged forty-eight months.

This information may be used clinically as a guideline for selecting appropriate stimulus tasks for assessing all children within these age groups, and particularly for children below the age of forty-two months. The task differences shown in this study should alert clinicians to look at specific tasks that elicit prepositions, along with age of acquisition data, rather than age of acquisition alone.

This research may also have implications for parents and teachers in planning activities that facillitate comprehension of locative prepositions in preschool children. Activities that would elicit the most correct responses might include those that are highly participatory in their response mode and that involve high-interest toys and materials that "fit" into the particular context. Activities that are non-participatory in nature, involve static objects or picture stimuli, and which are not relevant to the context may not give an accurate picture of children's comprehension of locative prepositions.

Another implication of this research for parents and educators is indicated in the wide range in performances that existed among these normal children, particularly among two to three year olds. These differences would suggest that individual rates of development should be a consideration in planning group activities, as well as in expectations for performance.

Research Implications

Further investigations to assess knowledge of prepositions using varied stimuli would be indicated. One area for continuing research would be obtaining information about other populations, such as language delayed or disordered students. Information concerning assessment in these populations might add to current knowledge about language development and remediation and could also be helpful in finding out more about coordinating remediation and assessment strategies.

Additional information concerning the specific properties of picture and object stimuli used in eliciting locative prepositions might be

useful in giving insight to assessing other language areas. Consequently, studies using similar tasks but assessing other language content or form might give this information.

Varying the objects that serve as stimuli, perhaps using "non-featured" rather than "featured" objects, systematically changing object size, contrasting static with dynamic objects, or familiar with unfamiliar objects, might give insight into perceptual factors operating in children's language comprehension and clinical information for selecting appropriate assessment materials. In addition, exploring the effect of using more naturalistic and contextually relevant methods within similar tasks might provide a number of implications for parents and educators.

Replicating the study using expressive rather than receptive responses would provide age of acquisition data and contrast these processes.

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APPENDIX A

Parent Permission Form

Dear Parent or Guardian:

I am a graduate student in the Speech and Hearing Sciences at Portland State University doing a research project. The purpose of the project is to collect information about how normal children understand positions and locations. The information may be helpful in understanding more about the language development of normal children.

I am requesting your written permission for your child's involvement in the project. Each child will spend approximately 30 minutes, divided into two 15-minute sessions, at their home or school looking at pictures and toys and following directions. Children included in the study will be given a hearing screening and a speech and language test free of charge. All information will be kept confidential and no names will be used in the written results. You are free to withdraw from the study at any time without penalty.

Results will be available upon request at Portland State University's Speech and Hearing Sciences Department, 69 Neuberger Hall.

If you have any questions or concerns, please call me at any time:

PSU (day): 229-3603
Home (evenings or weekends): 282-1721 or 245-1660

Sincerely,

[redacted]

Kathleen Gray

Approved by _____

Position _____

PLEASE RETURN THE ATTACHED PAGE OF INFORMATION BY: _____

I, _____ agree to allow _____
Child's Name
to participate in Kathleen Gray's research project.

_____ _____
Relationship to Child Date

For Data Analysis Purposes, Please Provide the Following Information:

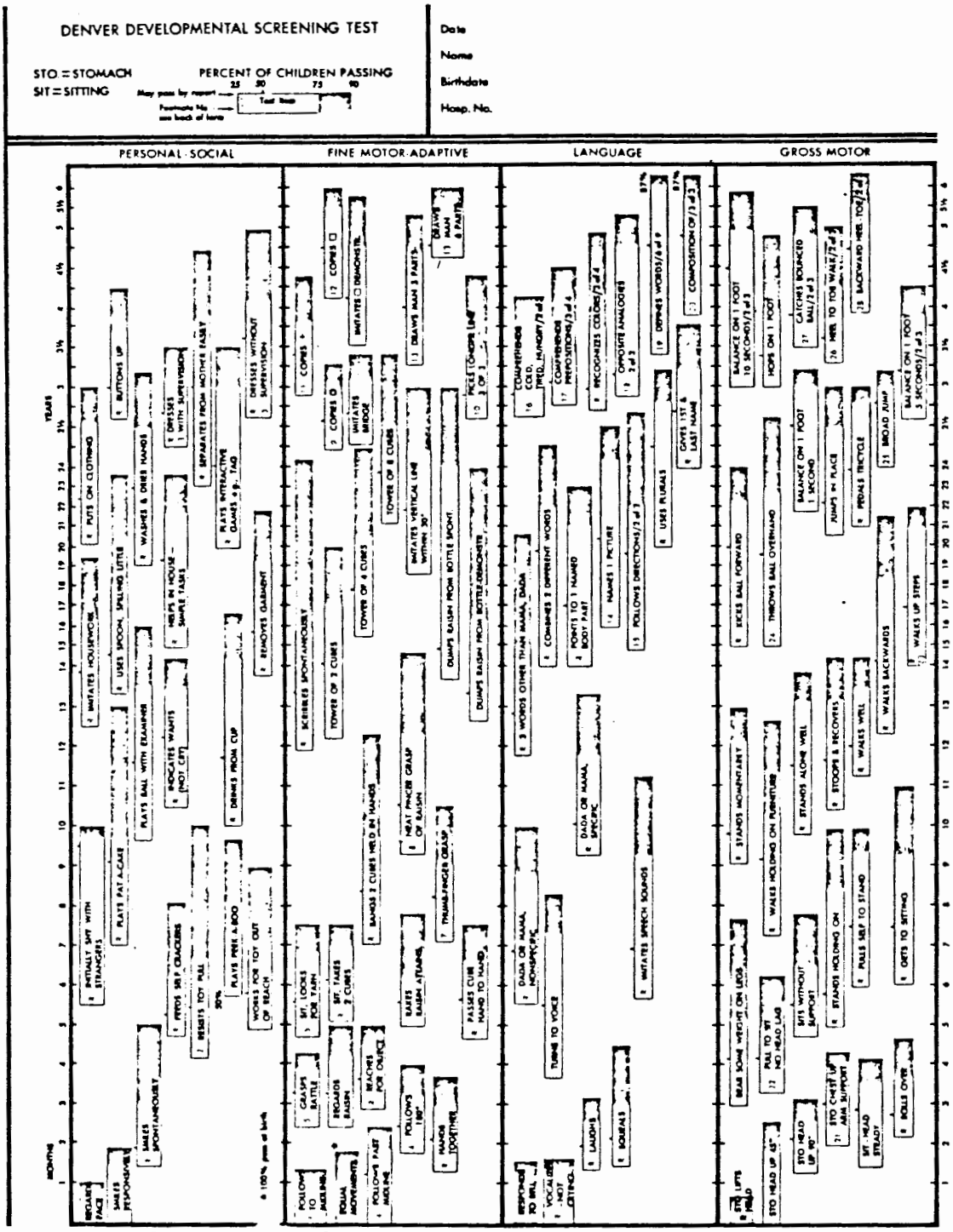
Occupation of one household member _____

Highest Educational Level attained _____

Your Child's birthdate _____

Which activities does your child do?	Never	Sometimes	All the Time
1. Imitates housework			
2. Uses a spoon, spilling a little			
3. Helps with simple household tasks			
4. Removes clothing			
5. Puts on clothing			
6. Buttons clothing			
7. Washes and dries hands			
8. Dresses with supervision			
9. Dresses without supervision			
10. Plays games with others (eg "Tag")			
11. Pedals tricycle			
12. Walks up steps by self			

APPENDIX B


DENVER DEVELOPMENTAL SCREENING TEST
STO = STOMACH
SIT = SITTING
PERCENT OF CHILDREN PASSING
Date
Name
Birthdate
Hosp. No.
PERSONAL-SOCIAL
FINE MOTOR-ADAPTIVE
LANGUAGE
GROSS MOTOR
MONTHS
YEARS

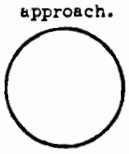
DATE

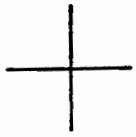
NAME

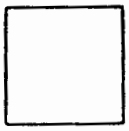
DIRECTIONS BIRTHDATE

HOSP. NO.

1. Try to get child to smile by smiling, talking or waving to him. Do not touch him.
2. When child is playing with toy, pull it away from him. Pass if he resists.
3. Child does not have to be able to tie shoes or button in the back.
4. Move yarn slowly in an arc from one side to the other, about 6" above child's face. Pass if eyes follow 90° to midline. (Past midline; 180°)
5. Pass if child grasps rattle when it is touched to the backs or tips of fingers.
6. Pass if child continues to look where yarn disappeared or tries to see where it went. Yarn should be dropped quickly from sight from tester's hand without arm movement.
7. Pass if child picks up raisin with any part of thumb and a finger.
8. Pass if child picks up raisin with the ends of thumb and index finger using an over hand approach.



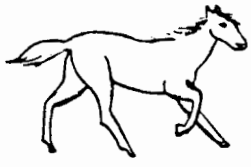


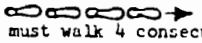
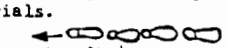


9. Pass any enclosed form. Fail continuous round motions.
10. Which line is longer? (Not bigger.) Turn paper upside down and repeat. (3/3 or 5/6)
11. Pass any crossing lines.
12. Have child copy first. If failed, demonstrate

When giving items 9, 11 and 12, do not name the forms. Do not demonstrate 9 and 11.

13. When scoring, each pair (2 arms, 2 legs, etc.) counts as one part.
14. Point to picture and have child name it. (No credit is given for sounds only.)



15. Tell child to: Give block to Mommie; put block on table; put block on floor. Pass 2 of 3. (Do not help child by pointing, moving head or eyes.)
16. Ask child: What do you do when you are cold? ..hungry? ..tired? Pass 2 of 3.
17. Tell child to: Put block on table; under table; in front of chair, behind chair. Pass 3 of 4. (Do not help child by pointing, moving head or eyes.)
18. Ask child: If fire is hot, ice is ?; Mother is a woman, Dad is a ?; a horse is big, a mouse is ?. Pass 2 of 3.
19. Ask child: What is a ball? ..lake? ..desk? ..house? ..banana? ..curtain? ..ceiling? ..hedge? ..pavement? Pass if defined in terms of use, shape, what it is made of or general category (such as banana is fruit, not just yellow). Pass 6 of 9.
20. Ask child: What is a spoon made of? ..a shoe made of? ..a door made of? (No other objects may be substituted.) Pass 3 of 3.
21. When placed on stomach, child lifts chest off table with support of forearms and/or hands.
22. When child is on back, grasp his hands and pull him to sitting. Pass if head does not hang back.
23. Child may use wall or rail only, not person. May not crawl.
24. Child must throw ball overhand 3 feet to within arm's reach of tester.
25. Child must perform standing broad jump over width of test sheet. (8-1/2 inches)
26. Tell child to walk forward,  heel within 1 inch of toe. Tester may demonstrate. Child must walk 4 consecutive steps, 2 out of 3 trials.
27. Bounce ball to child who should stand 3 feet away from tester. Child must catch ball with hands, not arms, 2 out of 3 trials.
28. Tell child to walk backward,  toe within 1 inch of heel. Tester may demonstrate. Child must walk 4 consecutive steps, 2 out of 3 trials.

DATE AND BEHAVIORAL OBSERVATIONS (how child feels at time of test, relation to tester, attention span, verbal behavior, self-confidence, etc,):

APPENDIX C

CCD-CDRC HEARING SCREENING SCHEDULE

Age	Materials	Procedures	Responses	Criteria	Interpretation
8-15 mos. (babbling-vowels and consonants	Quiet, meaningful sounds. Voice (whistle, name sh), cellophane, spoon-in-cup or noisemakers above	Present sounds at 3-4' from ear, alternate sides	Turn head or eyes toward sound, eye widening, quieting. Child may also vocalize as a response	2/3	Rules out all but mild loss
16-24 mos. (understands a few words)	Voice and 3 toys to identify (baby, bird, shoe or car)	In soft voice, call child's name, ask him to show you objects or to point to eyes, nose, or hair	Child points or gives objects	2/3	Within normal limits
2 years up	As above. Use any 4-5 objects he "knows"	As above, or simple commands: stand up, sit down, shut the door	Child points or follows commands	3/4	As above
3 years up	Audiometer	Screening audiometry, 1, 2, 4 .5KHz at 20-25 dB right and left	Raise hand, touch phone, or say "yes" when tone (whistle, beep) is heard	8/8	As above

APPENDIX D

TEST FOR COMPREHENSION OF FIVE LOCATIVE PREPOSITIONS

Task	Procedure	Stimulus Phrase	Correct Response
I	Examiner places a child-sized table, chair and truck in the room	"Show me 'on'"	Child places their body on one of the objects
		"Show me 'under'"	Child places their body under one of the objects
		"Show me 'next to' the truck"	Child places their body to the side of the truck
		"Show me 'in front of' the truck"	Child places their body in front of the truck
		"Show me 'in back of' the truck"	Child places their body in back of the truck
II	Examiner places a toy person, chair, table and truck on front of the child	"Show me 'on'"	Child places one toy on top of another
		"Show me 'under'"	Child places one toy under another
		"Show me 'next to' the truck"	Child places one toy to the side of the truck
		"Show me 'in front of' the truck"	Child places one toy in front of the truck
		"Show me 'in back of' the truck"	Child places one toy in back of the truck

Task	Procedure	Stimulus Phrase	Correct Response
III	Examiner places three stationary arrays of objects on the table, these include a toy person, chair, table, truck and car.	"Show me 'on'"	Child points/touches array illustrating 'on'
		"Show me 'under'"	Child points/touches array illustrating 'under'
		"Show me 'next to'"	Child points/touches array illustrating 'next to'
		"Show me 'in front of'"	Child points/touches array illustrating 'in front of'
		"Show me 'in back of'"	Child points/touches array illustrating 'in back of'
IV	Examiner places a page with three photographs showing toys in different positions Toys include a person, chair, table, truck and car.	"Show me 'on'"	Child points/touches picture showing 'on'
		"Show me 'under'"	Child points/touches picture showing 'under'
		"Show me 'next to'"	Child points/touches picture showing 'next to'
		"Show me 'in front of'"	Child points/touches picture showing 'in front of'
		"Show me 'in back of'"	Child points/touches picture showing 'in back of'

APPENDIX E

Rotation of Tasks and Prepositions

Presentation 1

Task	Preposition
I	1 - 2 - 3 - 4 - 5
II	2 - 3 - 4 - 5 - 1
III	3 - 4 - 5 - 1 - 2
IV	4 - 5 - 1 - 2 - 3

Presentation 2

Task	Preposition
II	1 - 2 - 3 - 4 - 5
III	2 - 3 - 4 - 5 - 1
IV	3 - 4 - 5 - 1 - 2
I	4 - 5 - 1 - 2 - 3

Presentation 3

Task	Preposition
III	1 - 2 - 3 - 4 - 5
IV	2 - 3 - 4 - 5 - 1
I	3 - 4 - 5 - 1 - 2
II	4 - 5 - 1 - 2 - 3

Presentation 4

Task	Preposition
IV	1 - 2 - 3 - 4 - 5
I	2 - 3 - 4 - 5 - 1
II	3 - 4 - 5 - 1 - 2
III	4 - 5 - 1 - 2 - 3

Presentation 5

Task	Preposition
I	2 - 3 - 4 - 5 - 1
II	3 - 4 - 5 - 1 - 2
III	4 - 5 - 1 - 2 - 3
IV	5 - 1 - 2 - 3 - 4

Presentation 6

Task	Preposition
II	2 - 3 - 4 - 5 - 1
III	3 - 4 - 5 - 1 - 2
IV	4 - 5 - 1 - 2 - 1
I	5 - 1 - 2 - 3 - 4

Presentation 7

Task	Preposition
III	3 - 4 - 5 - 1 - 2
IV	4 - 5 - 1 - 2 - 3
I	5 - 1 - 2 - 3 - 4
II	1 - 2 - 3 - 4 - 5

Presentation 8

Task	Preposition
IV	3 - 4 - 5 - 1 - 2
I	4 - 5 - 1 - 2 - 3
II	5 - 1 - 2 - 3 - 4
III	1 - 3 - 3 - 4 - 5

Presentation 9

Task	Preposition
I	4 - 5 - 1 - 2 - 3
II	5 - 1 - 2 - 3 - 4
III	1 - 2 - 3 - 4 - 5
IV	2 - 3 - 4 - 5 - 1

Presentation 10

Task	Preposition
II	4 - 5 - 1 - 2 - 3
III	5 - 1 - 2 - 3 - 4
IV	1 - 2 - 3 - 4 - 5
I	2 - 3 - 4 - 5 - 1

Presentation 11

Task	Preposition
III	4 - 5 - 1 - 3 - 2
IV	5 - 1 - 2 - 3 - 4
I	1 - 2 - 3 - 4 - 5
II	2 - 3 - 4 - 5 - 1

Presentation 12

Task	Preposition
IV	4 - 5 - 1 - 3 - 2
I	5 - 1 - 2 - 3 - 4
II	1 - 2 - 3 - 4 - 5
III	2 - 3 - 4 - 5 - 1

Presentation 13

Task	Preposition
I	5 - 1 - 2 - 3 - 4
II	1 - 2 - 3 - 4 - 5
III	2 - 3 - 4 - 5 - 1
IV	3 - 4 - 5 - 1 - 2

Presentation 14

Task	Preposition
II	5 - 1 - 2 - 3 - 4
III	1 - 2 - 3 - 4 - 5
IV	2 - 3 - 4 - 5 - 1
I	3 - 4 - 5 - 1 - 2

Presentation 15

Task	Preposition
III	5 - 1 - 2 - 3 - 4
IV	1 - 2 - 3 - 4 - 5
I	2 - 3 - 4 - 5 - 1
II	3 - 4 - 5 - 1 - 2

Presentation 16

Task	Preposition
IV	5 - 1 - 2 - 3 - 4
I	1 - 2 - 3 - 4 - 5
II	2 - 3 - 4 - 5 - 1
III	3 - 4 - 5 - 1 - 2

APPENDIX F

RAW DATA

AGE GROUP 1

	TASK 1 Self Actions					TASK 2 Manipulate Objects					TASK 3 Stationary Objects					TASK 4 Pictures					Totals
PREPOSITION	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Subject 1	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3
Subject 2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Subject 3	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Subject 4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Subject 5	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Subject 6	1	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Subject 7	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Subject 8	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	4
Subject 9	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Subject 10	1	0	1	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	6
Totals	6					16					4					0					26

AGE GROUP 2

	TASK 1 Self Actions					TASK 2 Manipulate Objects					TASK 3 Stationary Objects					TASK 4 Pictures					Totals
PREPOSITION	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Subject 11	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Subject 12	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	7
Subject 13	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0	5
Subject 14	1	1	0	1	0	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	9
Subject 15	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	4
Subject 16	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Subject 17	1	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Subject 18	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	19
Subject 19	1	1	1	0	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0	14
Subject 20	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	9
Totals	29					21					13					15					79

Preposition Key: 1 = "On" 4 = "In front of"
2 = "Under" 5 = "In back of"
3 = "Next to"

AGE GROUP 3

	TASK 1 Self Actions					TASK 2 Manipulate Objects					TASK 3 Stationary Objects					TASK 4 Pictures					Totals
PREPOSITION	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Subject 21	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	5
Subject 22	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	1	1	1	1	0	14
Subject 23	1	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	1	1	1	0	8
Subject 24	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	0	1	0	16
Subject 25	1	1	1	0	0	1	1	0	0	0	0	1	1	0	1	1	1	0	0	0	10
Subject 26	1	0	1	0	0	1	1	0	1	0	1	1	0	0	0	0	0	0	1	0	8
Subject 27	1	1	1	1	0	1	1	0	0	1	0	0	0	0	0	0	1	1	1	0	10
Subject 28	1	0	1	0	0	1	1	0	0	1	0	1	0	0	0	0	1	0	1	0	8
Subject 29	1	1	1	0	1	1	1	0	0	0	0	0	0	1	0	0	0	0	1	1	9
Subject 30	1	1	1	0	0	1	1	0	0	1	0	1	0	0	0	1	1	0	1	0	10
Totals	30					28					17					23					98

AGE GROUP 4

	TASK 1 Self Actions					TASK 2 Manipulate Objects					TASK 3 Stationary Objects					TASK 4 Pictures					Totals
PREPOSITION	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Subject 31	1	1	0	0	0	1	0	1	1	0	1	1	0	1	0	0	1	1	1	0	11
Subject 32	1	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	1	1	0	0	7
Subject 33	1	1	1	1	0	1	1	1	1	0	1	1	0	0	0	1	1	0	0	1	13
Subject 34	0	0	0	0	0	1	1	0	1	0	1	1	0	0	0	0	1	0	0	0	6
Subject 35	1	1	0	0	0	1	1	0	0	1	0	1	1	0	0	0	1	0	1	0	9
Subject 36	0	0	1	0	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	12
Subject 37	1	1	0	1	0	1	1	0	1	1	0	0	1	1	1	0	1	1	1	0	13
Subject 38	1	1	0	1	0	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0	12
Subject 39	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	15
Subject 40	1	1	0	1	1	1	1	0	1	1	1	1	1	0	0	1	1	0	1	0	14
Totals	26					38					25					23					112

Preposition Key: 1 = "On" 4 = "In front of"
2 = "Under" 5 = "In back of"
3 = "Next to"

AGE GROUP 5

	TASK 1 Self Actions					TASK 2 Manipulate Objects					TASK 3 Stationary Objects					TASK 4 Pictures					Totals
PREPOSITION	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Subject 41	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	19
Subject 42	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	15
Subject 43	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	1	1	1	1	17
Subject 44	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	19
Subject 45	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	19
Subject 46	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
Subject 47	1	1	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	1	14
Subject 48	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	19
Subject 49	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
Subject 50	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0	17
Totals	47					48					41					43					179

AGE GROUP 6

	TASK 1 Self Actions					TASK 2 Manipulate Objects					TASK 3 Stationary Objects					TASK 4 Pictures					Totals
PREPOSITION	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Subject 51	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	0	1	0	14
Subject 52	1	1	0	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	16
Subject 53	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	18
Subject 54	1	1	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	17
Subject 55	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	19
Subject 56	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
Subject 57	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	19
Subject 58	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	17
Subject 59	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	19
Subject 60	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	19
Totals	46					47					46					39					178

Preposition Key: 1 = "On" 4 = "In front of"
2 = "Under" 5 = "In back of"
3 = "Next to"