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The development of place categorization in children

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THE DEVELOPMENT OF PLACE CATEGORIZATION IN CHILDREN

by

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ABSTRACT

THE DEVELOPMENT OF PLACE CATEGORIZATION IN CHILDREN

by

Shelley Pazer

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The purpose and focus of this dissertation is to study the types of places children at 5, 8, and 12 years of age know, how they categorize them and what meanings they give to these places. It is also designed to begin to reveal how the language of place develops in children throughout the pre-adolescent years. In pursuit of this goal, the major contributing theories from a variety of fields are discussed with special attention given to the conceptual orientations and methodological frameworks of "contextual" approaches to category development. While there is variation along a number of dimensions in the approaches taken by these investigations, they are bound by an important underlying assumption that the environment plays a substantial role in cognitive and behavioral development. However, there has been little systematic research on the organization of place knowledge, particularly in child representational systems.

This dissertation examines the development of the structure of categories of environments in a manner analogous to the construction of taxonomies of concrete objects. This approach uses a production

paradigm which is both systematic and flexible. It is expected to provide a way of directly determining the structure as well as the features associated with place categories.

Children in this research produced a taxonomy of places similar in structure to an adult taxonomy but different in content. A basic level of categorization was identified. The basic level categories had the greatest number of attributes and activities common to members of each place category while also sharing the least number of attributes and activities with members of other basic level place categories. Age changes occurred in an increase in number of place categories generated and in degree of agreement on typical place category members and typical attributes and activities associated with places. One exception to these changes was at the basic where all age groups agreed to the same extent on typical category members. For all age groups and at all levels of abstraction, places appeared to be better defined by activities than by attributes.

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CHAPTER I

INTRODUCTION

The Study of Place Cognition in Environmental Psychology and the Need to Incorporate a Developmental Perspective

Multidisciplinary interest in the relationship between person and environment during the mid-twentieth century grew out of the Zeitgeist of the times. Disciplines such as geography, architecture and planning joined with personality and social psychology to investigate people's perceptions of the everyday environment as fundamental to understanding people's behavior in context. Some of this activity resulted in the development of a new field: environmental psychology (Barker, 1968; Craik, 1973; Mischel, 1973; Moos, 1973; Price and Blashfield, 1975). This review will focus upon that part of the field termed environmental cognition.

Boulding (1956) presented the thesis that all human activity is predicated upon the 'image'--a person's known or believed universe--which is not necessarily isomorphic to the objective external world. This treatise provided the impetus and theoretical basis for much of the study of environmental cognition. These mental conceptions of the environment or environmental images are multi-dimensional in nature. They serve to classify, categorize, assign meaning to, and so differentiate between locations. These images also serve as a means of explaining, and possibly predicting behavior (Pocock & Hudson, 1978).

From this perspective, past as well as present experiences, perceptions, feelings and beliefs predispose an individual to behave in a particular way in a particular situation (Sherrod et al., 1977). This implies that people may be cognitively active and goal-oriented, often devising plans concerning their behavior in a place prior to direct experience with that place (Stokols, 1981). In other words, the environment is more than a single stimulus with a direct causal influence upon behavior; it is a complex of immediate and distant places incorporating the dimensions of time as well as space (Russell & Ward, 1982). This multi-dimensional nature of the 'image' suggested that the environment allowed a diversity of personal meanings including the knowledge latent in environmental forms and activities to which people are exposed, knowledge gained as characteristics of the environment are learned, and knowledge upon which people base plans of action to satisfy individual and social purposes (Steinitz, 1968).

The concept of the "image" also allowed it to serve as an approach which cut across conventional disciplinary boundaries (Burton, 1963; Wood, 1970). The variety of disciplines which borrowed this concept were inclined to their own methodological and philosophical stance and were often at variance in the assumptions on which they were based and on the findings they produced (Pocock & Hudson, 1978). They often explored different aspects of environments and images (e.g., form, structure, activity, affect) at different levels of analysis (e.g., factor analysis, multidimensional scaling, attitude questionnaires) which yielded results and interpretations

unique to each study. Additional conceptual and practical problems were encountered when measuring a person's or group's environmental image at two points in time. Images often did not remain stable and invariant over time (Craik, 1970; Tversky, 1981). To what degree could the differences be attributed to cognitive change or 'noise' variation arising from the nature of the methodology?

This considerable body of research of isolated empirical findings which evidenced both intra- and interpersonal changes over time highlights the need for a broader theoretical framework in which the links between the structure and context of the mental conceptualization and the generative processes that effect it can be specified (Ittelson, 1978; Pocock & Hudson, 1978). It has been suggested that the extraction and use of environmental information can be addressed through the development of environmental taxonomies and categories (Fredericksen, 1972; Ittelson, 1978; Price and Blashfield; 1975).

The Study of Children's Categorizations in Developmental Psychology and the Absence of Research on the Geographic Scale

There is a large literature in developmental psychology reporting research on how children categorize objects. To this date no research has been conducted on how children categorize the large-scale or geographic environment. Places are of such a scale that they cannot be physically manipulated or perceived from one location nor do they tend to have recognizable shapes. Consequently more information about places is likely to be secondary rather than

direct. It is therefore reasonable to believe that how children develop in their categorization of places may be different from how they develop in their categorization of objects.

On a more ambitious level, the study of children's place categorization should be able to lead to some useful contribution to the conceptualization of relevant contexts in developmental psychology research. Contextual research is growing in developmental psychology. Bronfenbrenner (1979) has called for the "Ecological Study of Human Development" whereby developmental psychologists would not only identify the important contexts for study but would investigate child development issues arising from the relationship of these contexts to one another, such as school and home or day-care and parents work-place etc. This kind of research question is growing in importance in the field but there is an absence of research on what constitutes the relevant contexts or situations in children's lives. How children themselves categorize places and subsequently how they categorize contexts or situations would be one important contribution to the construction of such a taxonomy of relevant contexts.

REVIEW OF LITERATURE

To facilitate exploration of this area, the following topics will be discussed:

- the principal studies and procedures that have been used to investigate conceptualization of the environment (environmental images);
- the cognitive developmental view of the structure of categories and the systems by which categories are related to one another;
- research which has extended the conceptual and theoretical framework developed within cognitive psychology to characterize adult and child knowledge of objects;
- developmental differences in categorical relationships within and across context areas; and,
- recent evidence for an adult taxonomy of environmental scenes within this framework.

Following this review, a summary of the limitations of the research to date leads to a conclusion regarding the approach proposed by this dissertation.

Approaches to Characterizing the Environment

Many approaches to understanding the person-environment relationship have attempted to uncover the fundamental dimensions

along which people conceptualize places. The major lines of inquiry have focused on dimensions of physical form, activities/behavior and affect.

The classic work of the urban designer Lynch (1960) found that environmental images of cities were organized and remembered by specific landscape elements. This study utilizing sketch maps drawn by residents of three cities provided the groundwork for extensive research on people's representation of the spatial structure of physical environments (Appleyard, 1970; Downs & Stea, 1972; Milgram, 1970). Lynch divided the environmental image into 'identity, structure and meaning'. While his system of analysis concentrated on the organization of an individual's knowledge of form, this knowledge was generally found to include activity content and meaning. Research has shown that environmental concepts are acquired and sustained by an underlying network representing the individual's activity space. Gulick (1963) hypothesized that conceptualization is a combination of a person's perception of the physical form of an environment and awareness of some social or behavioral significance associated with that place. Research with adults has found that the activities that occur in a particular place are the principal determinants of environmental concepts (Steinitz, 1968).

Steinitz (1968) examined the relationship between physical form and activity in an urban area (Central Boston) using an interview method to discover which places were best known, how they were identified and for whom they were meaningful. Interviews consisted of asking residents about the form and activities in the area as well

as having them represent these forms and activities on base maps. Residents varied relative to whether they were inner or outer city residents, whether they travelled by automobile or mass transit and whether they were lower- or middle-class.

Results indicated that for all subjects the frequency with which a person used a place was the most consistently high correlate of how accurately aware the person was of its form and activity attributes. While activity patterns in an area tended to dominate subjects' knowledge of the area, activity knowledge was greater when consequently reinforced by form distinctions.

These findings suggest that not only form and function but the relationship between the two is of primary importance in environmental conceptualization. However, most research examines particular dimensions and neglects others. This suggests the need for a broader systematic theoretical framework.

Another approach to environmental concepts has been to examine environmental descriptors found in language. Many such studies have found that concepts of environments are a mix of affective and denotative meaning (Russell & Pratt, 1980). This has been explored through factor analytic studies of everyday language traits of places (Craik, 1968) and multidimensional scaling studies of the judged similarities or preferences among places (Ward, 1977). These studies found that environmental attributes were highly correlated, similar to attributes of objects which were found to possess high correlational structure (Rosch et al., 1976). Additionally, the relationships among attributes were highly diversified (causal,

definitional, and empirical) and yielded many different interpretations (Ward & Russell, 1981).

Ittelson (1973) suggested three interrelated processes that are involved in an individual's extraction and use of environmental information for building a conception of place: 1. Environmental exploration; 2. the continuous process of developing categories and constructing a taxonomy of the environment; and, 3. the process of systematization of the experienced environment into a functional whole through analysis of environmental contingencies.

This dissertation research is concerned with the second of these processes. Categorization processes are viewed by cognitive theorists as a means to reduce the complexity of the stimulus world, to provide organization and to increase the ability to apprehend future events (Bruner, 1957). Theoretical and empirical research indicate that the world is perceived by individuals as structured rather than consisting of arbitrary events and that perceptions and conceptions are organized in terms of generic expectations about objects, situations and people (Cantor & Mischel, 1977; Rosch, 1978; Schank & Abelson, 1977).

While several investigators of environmental cognition have suggested that a developing generalizable system of environmental categories, concepts and relationships play a major role in the individual's expectations and experiences of places (Appleyard, 1973; Carr & Schissler, 1969; Rapoport, 1977), few of these investigators specifically explored the nature of environmental categories and their consequences.

Evidence exists that geographical or place knowledge changes with development. Many studies have shown that with age children learn and use more of the geographic information diffused by their culture. However, most of these studies, have not investigated the construction and organization of geographical place knowledge in children. Rather, studies have been of the following four types:

1. The largest set of literature has investigated children's ability to represent the large-scale environment and has ignored the "content" of their place knowledge (reviews by Hart & Moore, 1973; Siegel & White, 1972);
2. Some normative studies explored children's geographic knowledge in terms of the ability to answer questions about particular places (Ames & Learned, 1948; Gould & White, 1974);
3. Other normative studies investigated the development of concepts of nation and national prejudices (Hess & Torney, 1967; Jahoda, 1963); and,
4. A fourth set of studies examined children's use, knowledge and feelings for places in their local environments (Hart, 1979; Hart, 1985; Katz, 1987; Sells, 1963; Southworth, 1970).

In a study of the "spontaneous geography" of children involving drawing, mapping exercises, and geographic puzzles, Piche (1977) investigated how children divide the continuity of space into places interpreted names of places and land uses, structured geographic space, understood hierarchies of geographic concepts, and explained

and judged the world. Piche (1981) suggested that children actively compare different places, spatially relate places that are disconnected in their temporal experience, question the origin of places and learn the names of geographic categories in order to make sense of their experiences.

Piche's (1981) findings suggested that the development of geographical knowledge involves the integrated construction of all geographical notions in a sequence parallel to Piaget's stages of development. According to Piche, it is not until the end of the concrete operational period that children develop a classification of places, seriation and spatial continuity. However, Russell and Ward (1982) suggested that environmental categories and hierarchies may be of two distinct types: Geographic inclusion, as when Paris is part of France, and categorical inclusion, as when Paris is an instance of a city. Piche's (1977) research was conducted within a geographical inclusion framework. This dissertation is concerned with categorical inclusion. The theoretical frameworks for these two approaches differ significantly in their procedures, assessments and interpretations of children's knowledge. Empirical and theoretical research which bear on the organization and interpretation of knowledge according to each approach is considered below.

The Development of Children's Understanding of Geographical Inclusion

Piaget (Piaget, 1928; Piaget & Weil, 1951) proposed a spatial stage theory to explain how children become able to comprehend various geographical units and organize them into logical

hierarchies. He investigated the development of the idea of homeland with Swiss children through inquiries about geographical/spatial relationships and nationality conceptions. The results of these inquiries suggested that children pass through three distinct developmental stages:

1. Stage I pre-operational children, up through 7 to 8 years of age, perceive all territories (town, canton, country) to be of approximately equal size. Additionally, these territories are perceived to be mutually exclusive. Piaget noted that children did not understand geographically or logically that Geneva is in Switzerland. They represented the geographic relationship between Geneva and Switzerland as two juxtaposed circles. They also did not logically understand that if they are Genevans, they are also Swiss.
2. Stage II children, ages 7 to 8 years through 10 to 11 years, are in the process of decentration and integration of territories. Thus, children could often verbally and spatially express that city is included in country while not understanding that one could be logically included in the other. Children at this stage could often demonstrate both spatially and verbally the correct geographic relationship between Geneva and Switzerland. They drew the relationship as one circle enveloping another and expressed verbally that city is included in country. However, they still did not understand logically that a part which is fitted into a whole forms part of the whole, and that they,

therefore, could be Genevese and Swiss simultaneously.

3. In Stage III of abstract operations children attain correct geographic notions and relationships. Children are able to decenter territory so that the correct inclusion relationships are realized both geographically and logically.

Piaget and Weil (1951) hypothesized that as children progress through the three stages their ideas about places move from an extreme form of egocentrism to a nonegocentric form of conceptualization. At the first stage, children lack the requisite decentration to conceive of their town as enclosed in a larger whole. Reality is centered around their own particular surroundings and activities, and they have only the vaguest notions about their country or homeland. At the second stage, the process of decentration has begun. Piaget considered this a transition stage in which a move toward decentration enabled children to broaden their centers of interest and grasp the idea of spatial inclusion relationships, but not logical relations. Therefore, they could understand that Geneva is part of Switzerland while not understanding that this means that they can be Genevese and Swiss at the same time. At the third stage, the notion of country or homeland becomes a reality. Thus, children are able to decenter territory to the national level so that correct inclusion relationships are grasped territorially and logically.

In order to better understand Piaget and Weil's (1951) findings, it is important to look more closely at the differences

between spatial relation abilities and nationality relation abilities. The differences between these two abilities are similar to Markman's (Markman, 1981; Callanan & Markman, 1982) distinction between collections and classes. According to Markman, while both collections and classes are hierarchically organized, they differ in structural principles.

Part-whole relations are described by Markman (1981) as 'more literal' in collections than in classes. In a collection an object is 'part' of the whole (e.g., An oak is part of a forest) whereas in a class an object is an 'example' of the whole (e.g., An oak is an example of a tree). Callanan and Markman (1982) found that children as young as two years of age tended to treat natural class inclusion hierarchies as if they were organized into collection structures. They suggest that the organization of the collection may be a simpler one for children to conceptualize. As 'part' of a whole, an object in a collection is, in a sense, contextualized. Since everyday objects are encountered in spatial, temporal and causal contexts, the organization of the collection may be a natural way to construe relations in the world. An object in a class, on the other hand, must be abstracted from the whole in order to determine membership.

If we extend Markman's (1981) work to Piaget's geographical stages, it appears that spatial relations resemble collections (e.g., Geneva is part of Switzerland) while nationality relationships resemble classes (e.g., Genevese is a type of Swiss). Thus, we would expect as Piaget and Weil (1951) hypothesized, that spatial/geographical relations are grasped earlier than

nationality/logical class inclusion relations. However, as Jahoda (1964) pointed out, nationality is a highly abstract class, and nationality relations tasks may not adequately assess categorical inclusion abilities. According to Jahoda, there is evidence of greater class inclusion abilities in children than is demonstrated by their performance on Piaget's nationality tasks.

Whether or not nationality tasks adequately assess class inclusion abilities, Piaget and Weil (1951) note that class inclusion abilities, in general, are at the heart of spatial stage progression. Piaget's theory of spatial stages parallels his theory of how children develop in the areas of classification and class inclusion:

1. During Stage I children construct figural collections which are not true classes but random collections of objects. Children also have difficulty with class inclusion relationships.
2. At Stage II, children make "legitimate" collections of classifications. However, the way in which the elements within the class are related to the class as a whole is not yet clearly understood. Children have no clear understanding that a subordinate class may be included in and form part of a superordinate class.
3. It is at Stage III that children construct hierarchical classifications and can comprehend class inclusion relationships.

Rand and Towler (1973) investigated the relationship between the child's conception of geography and territorial relationships with

that of the child's competence on classification and class inclusion measures using a Geographical Stages Test and a Logical Thinking Test. The Geographical Stages Test included four subtests: A Verbal Geographic Stages Test, two Spatial Stages Tests and a Nationality Stages Test.

The Logical Thinking Test also involved four subtests: A Single Classification Test, two Multiple Classification Tests and a Class Inclusion Test.

Consistent with Piaget and Weil's (1951) premise, results indicated a strong relationship between general classification-class inclusion abilities and territorial-spatial inclusion relationships. However, consistent with Jahoda (1964), the Nationality Stages subtest did not appear to measure the later developing class inclusion abilities. On the contrary, it was the easiest subtest for children.

Subsequent investigators attempted to verify Piaget and Weil's (1951) findings with different samples of children varying in race, gender, residential background, and socioeconomic status (Jahoda, 1963; Rand & Towler, 1973; Stoltman, 1971). Jahoda found that the Scottish children in his study lagged behind Piaget's sample in spatial stage progression. Additionally, Jahoda found that working-class Scottish children progressed through the stages more slowly than did middle-class children.

Stoltman (1971) used a sample of American children and found that similar to the Scottish children they lagged behind Piaget and Weil (1951) sample. Stoltman also found socioeconomic differences with

lower-class children progressing more slowly than middle-class children. Significant differences between races were reported by Stoltman with Black children lagging behind White children. However, race and socioeconomic class appeared to be confounded such that most Black children were included in the lower socioeconomic group. No differences between children from urban versus rural backgrounds and no gender differences were found.

Rand and Towler (1973) corroborated findings that American children progress more slowly than Swiss children through spatial stages. However, they did not find differences between children relative to gender, residential background and socioeconomic class.

With the exception of some methodological variations between studies, no clear explanation of why children progress through these stages at different rates has been offered. Piaget and Weil (1951), Jahoda (1964), and Rand and Towler (1973) suggested that travel experience may be partially responsible for territorial decentration and progression through spatial stages, but there has been no empirical investigation of this variable.

Research by many cognitive and developmental psychologists in categorization offers another approach to looking at the physical environment. These psychologists claim that evidence of categorization appears prior to logical class inclusion abilities. According to the work of Inhelder and Piaget (1964) on the development of children's classification ability, young children are unable to sort objects into classes (See Flavell, 1970, for a review of free-classification research). Inhelder and Piaget found that

when presented with a number of objects which could be classified along a variety of dimensions, young children construct graphic collections with frequent shifts in the basis of classification. More recent research (Markman, Cox & Machida, 1981; Nelson, 1973; Sugarman, 1979) indicates that young children can categorize and sort objects non-graphically. Nelson found that children between 1 year 7 months and 1 year 10 months spontaneously grouped small toy cars and small toy planes into two separate groups--cars and planes. Children also created two distinct groups from plastic eating utensils and plastic animals.

Markman, Cox and Machida (1981) suggested that the nature of the sorting tasks given to young children may greatly influence the categories they form. Children were asked to sort objects from categories of furniture, people, vehicles and trees into plastic bags versus onto sheets of paper. They generally sorted on the basis of category into the plastic bags but created designs or scenes on the sheets of paper.

Rosch, Mervis, Gray, Boyes-Braem and Johnson (1976) suggested that the stimulus arrays typically used in studies of free sorting behavior may not adequately represent the structure of stimuli in the real world. They tend to be either abstract (e.g., geometric forms varying in color, shape, etc.) with each attribute occurring with all combinations of all other attributes, or representational (e.g., pictures of objects or toy versions including objects that can only be grouped taxonomically at the superordinate level. For example, children tend to be presented with different types of animals or

different articles of clothing rather than with several examples of one type of animal or one article of clothing. Thus, whether young children sort objects graphically or non-graphically depends on the nature of the arrays they are presented with.

Rosch and her colleagues (1976) hypothesized and empirically investigated a theoretical framework for classification of real world objects which differs from Inhelder and Piaget's (1964) framework in its basis, methodology, and stimulus arrays. While Rosch et al. did not systematically extend their theory to a developmental investigation of physical environment or place categories, it appears to offer a fruitful form of analysis. It is both systematic and flexible and allows characterization of the content (attributes, activities) of environmental place (physical environment) categories (Tversky & Hemenway, 1983). A discussion of Rosch's theoretical framework and its implications for this dissertation research are presented below.

The Development of Children's Categorization of Natural Objects

A position implicit in much psychological and anthropological research has been that individuals segment the world arbitrarily. In contrast, Rosch and her collaborators (1976) pointed out that it would only be understandable to view categories as initially arbitrary if the world was completely unstructured. However, real world entities reflect the view that the world is not completely arbitrary: Not all possible combinations of values of attributes occur. This correlated attribute structure of the perceived world

serves as the basis for Rosch's research on natural category structure. More specifically, Rosch and her colleagues proposed that the world contains 'intrinsically separate things' rather than stimuli on a continuum due to the following three principles:

1. Unlike the artificial stimulus arrays typically used in concept identification research and free sorting tasks, real world attributes do not occur independently of one another.
2. Because the objects of the world are determinately structured, levels of abstraction in class-inclusion hierarchies are highly structured with some categories being superordinate or subordinate to others. Of the many levels of abstraction, there is one basic level of abstraction at which the individual can obtain the most information with the least cognitive effort.
3. When correlational structure in the world is only partial or when attributes are continuous thereby producing categories which might blend with other categories at the same level of abstraction, these categories remain discrete. They remain discrete because they are coded in the mind in terms of prototypes of the most characteristic members of the category.

In the general-to-specific hierarchy of categories, the most "cognitively basic" categories are in the middle. Generalization proceeds "upward" from the basic level and specialization proceeds "downward". It is at the basic level that people most accurately distinguish hammers from screwdrivers, tables from chairs, pants from

shirts, oranges from bananas, etc.. Distinctions are more difficult one level "down" at the subordinate level. Differentiating one type of hammer from another is harder than differentiating a hammer from a screwdriver (Lakoff, 1987).

Empirical investigations by Rosch et al. (1976) have shown that the basic level of abstraction is more useful than other levels because it is informative while minimizing the number of different categories an individual has to deal with. If categories are informative, then knowing what category something belongs to will reveal many attributes of that thing while minimizing irrelevant or more specific distinctions or attributes.

Within the hierarchy of categories, basic level categories (e.g., chair category; table category) have the highest cue validity. That is, they have the most attributes common to members of the category and the least attributes shared with members of other categories. For example, members of the "chair" category share many predictable attributes and functions with one another, but share very few with members of the "table" category and are therefore readily distinguishable and informative.

Members of superordinate level categories (e.g. members of the furniture category) share only a few common attributes and functions with one another and with other superordinate level categories.

Within subordinate level categories (e.g. kitchen chair category; rocking chair category) members share a higher number of attributes and functions, but they also share many with other categories. This means, for example, that kitchen chairs share many attributes and

functions with one another as well as with other kinds of chairs. Therefore, the kitchen chair category is not highly distinguishable.

According to Rosch et al. (1976) the basic level for objects is also the most general level at which category members have similar overall shapes, the level at which adults spontaneously and most quickly name objects and the level first named by children.

Lakoff (1987) also points out, that the basic level exists not only for objects but for actions and properties as well. Therefore, actions such as running and drinking are basic level, whereas moving and ingesting are superordinates and ambling and slurping are subordinates. Similarly, tall and short, and hard and soft are basic level properties.

This theoretical framework for classification and hierarchization differs from the Piagetian approach in a number of ways. Rosch and Piaget differ in the form of conceptualization they consider most basic to thinking. Rosch considers natural categories to be most basic. The environment is seen as providing correlational structure which places constraints on categories. Therefore, categories are detected, not abstracted. Rosch implies that the content knowledge of categories changes with age, not necessarily the nature of representation. Therefore, any discussion of the internal representation of the world is minimal in her theory. Piaget considers logical classes to be most basic to thinking. For Piaget, different kinds of representation emerge with age. Intellectual development results in changes in representation which in turn enhance intellectual development.

The difference in degree of importance attached by Rosch and Piaget to internal representations may be better understood if we look at the foci of their research. Rosch (1973) states that objects may be categorized at each of several hierarchical levels and that a taxonomy is formed when the levels are related to one another by class inclusion. However, research by Rosch et al. (1976) focuses on the primacy of one level, the basic level, and does not provide systematic developmental exploration of the whole (logical) taxonomic system, as does Piaget. While Rosch claims that some aspects of logical categorization develop with age, she only refers to the period of sensori-motor development to support the primacy of the basic level. Since basic objects are the most inclusive categories for which an image can be formed, then basic objects should be learned easily by children if they encode the world by images or other iconic representations before they encode more symbolically.

It is possible that a broader examination of the development of logical taxonomies within Rosch's framework would reveal a developmental process closer to Piaget's in its association to different kinds of internal representation. One way to begin to more fully understand the development of the categorical system is to look more systematically at the changes in content (members, associated attributes and behaviors, etc.) of children's categories with age.

The basis of classification in children for Rosch et al. (1976) was determined through tasks which measure knowledge of a particular hierarchical inclusion relation in the world whereas the Piagetian approach measures the ability of children to operate upon that

relation by adding and subtracting classes and comparing parts to wholes with an arbitrary set of objects in an experimental situation. Therefore, findings of Rosch et al. are interpreted as evidence that young children do sort and categorize objects at some level of abstraction, while findings of Inhelder and Piaget (1964) are interpreted as evidence that young children sort and classify on a nontaxonomic basis. These different theoretical bases lead to usage of different types of stimulus arrays. Stimuli used by Inhelder and Piaget were of the superordinate level. Rosch et al. found that few young children could sort at the superordinate level. However, when basic level stimuli were used, basic level sorts were virtually perfect at all age levels. This suggests that significant classification competencies are present from the earliest ages, although much remains to be developed by a child.

While Rosch et al. (1976) claim that regardless of age learning begins with basic level categorization and representative instances, she suggests that the content knowledge of particular categories changes. With experience, more attributes are noticed, more instances of a class are added, and subcategories are created. It has been argued that differential experience or expertise can change classification schemes (Dougherty, 1978). An expert in a particular domain makes use of attributes that are ignored by the average person (Rosch et al., 1976). Thus, the basic level to an expert may be a subordinate category to a novice. It has been suggested that basic level categories for adults are not necessarily basic level for children. Brown (1959) argued that the functions of some items

differ for children and adults, and therefore result in different levels of differentiation. Mervis and Mervis (1982) claim that the properties children notice in an object often differ from the properties adults notice because children's knowledge about objects and their culturally appropriate functions is more limited. Empirical investigation by Mervis and Mervis indicated that children's basic categories often differ from adult basic categories.

Nelson (1985) claimed that in order to understand conceptual and categorical development, it is necessary to look at knowledge of the context within which objects are embedded. The context of objects was hypothesized by Nelson to be an event and event representations or scripts would form the context of concepts and categories of objects. Scripts are generalized representations of activities involving roles that people play and objects that they interact with in the course of an activity (Schank & Abelson, 1977). Event structures form the temporal context in which objects are props (Rosch, 1978). Environmental scenes form the spatial context for objects (Tversky & Hemenway, 1983). Scenes are analogous to scripts in that both are contexts for objects.

As Rosch (1978) claimed, it is predetermined that there will be context effects for both the level of abstraction at which an object is considered and for which items are named, learned, listed, or expected in a category. If objects are props within contexts, then understanding more about contextual knowledge might help to explain the level of abstraction, the attributes and the functions associated with objects. Preliminary investigations by Rosch (1978) and Rifkin

(1984) looked at whether any of the principles found useful for understanding categories of concrete objects applied to knowledge of the contextual unit of the event. Initial results showed that adults categorize events similarly to objects, at different levels of abstraction with one level being basic or most informative.

Adult Place Categorization

Tversky and Hemenway (1983) systematically extended the Rosch et al. (1976) framework for considering object categorization to the categorization of places which they call "scenes". In their study, adults constructed a hierarchy of environmental scenes in a manner analogous to the construction of hierarchies of natural objects. Subjects produced the category instances as well as the associated attributes and activities. Additionally, a basic level was established. The hierarchy of scenes generated by adults in their study is displayed in Fig. 1.

According to Tversky and Hemenway's (1983) research, environmental scenes are categories in and of themselves in addition to being the spatial contexts in which objects appear. Generic or superordinate level scenes were found to share few attributes or activities in common; more specific or basic level scenes shared many attributes and activities in common. These findings corroborate the Rosch et al. (1976) findings for non-biological (e.g.; tools; clothing) and biological (e.g., trees; fish; birds) category levels of abstraction. It is important to note that the majority of attributes associated with scenes were objects or 'parts' of scenes

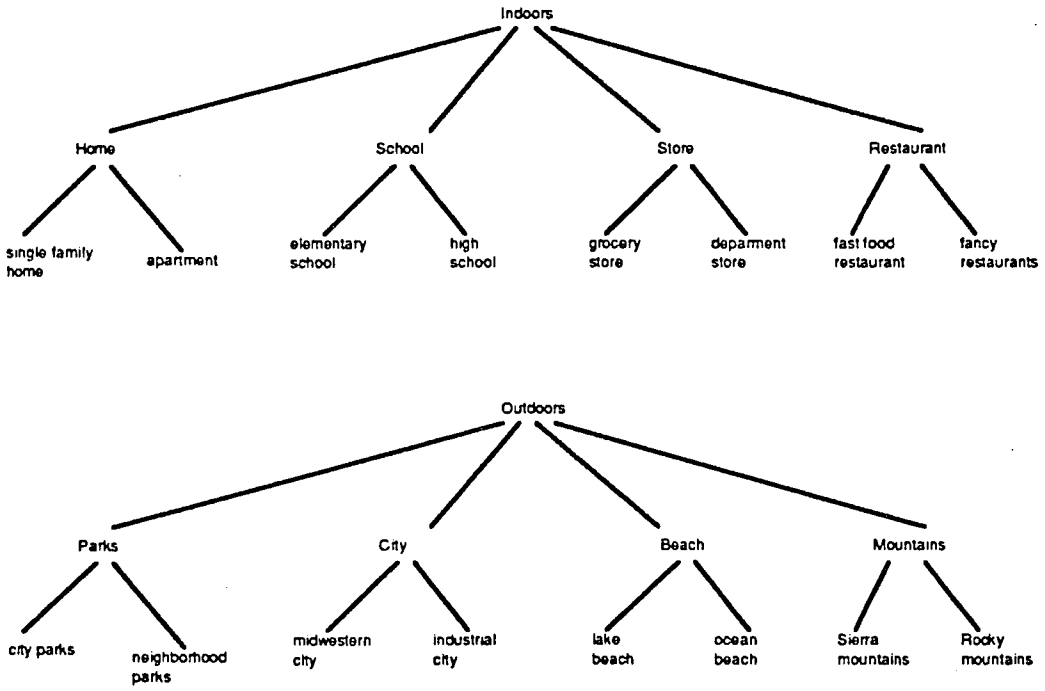

Figure 1. Hierarchy of scenes.

(e.g., benches; swings; teachers) rather than adjectives (e.g., high; cold; small). An increase in shared parts was found to be diagnostic of the basic level. Research with objects (Rosch et al., 1976) found that subjects preferred to label objects with basic level terms. In the Tversky and Hemenway study, subjects used basic level terms to label photographs of scenes and in completing sentences describing activities performed in scenes even though more specific or more general terms would have been appropriate. The usage of basic level labels for scenes provides further evidence of a basic level in scene categories.

While Tversky and Hemenway (1983) extended the theoretical and methodological framework of Rosch et al. (1976) they focused on adult knowledge only. If amount of knowledge and experience affects classification schemes, and if knowledge of and experience with particular environments differs between children and between children and adults, then classification schemes of environmental "scenes" as well as associated functions or activities and attributes may be expected to differ. Related research by Hart and Pazer (1982) found that children's conceptions of cities and suburbs varied with age and travel experience. Urban and suburban children at three age levels (5-, 8-, and 12-year olds), half with travel experience and half without, were interviewed. Children were asked to discuss what a city is and how it differs from places that are not cities, focusing in particular on form and attribute and activity differences. In general, with age, children spoke more extensively about cities and suburbs and made more differentiations in attributes and activities

associated with each. Within age groups, particularly 5- and 8-year olds, children with travel experience were more articulate about cities and suburbs and differences between them.

Extension of the Tversky and Hemenway (1983) research to children's categorization of the spatial environment is of interest for several reasons:

1. The spatial environment has been a major research concern in a wide variety of disciplines including cognitive, personality, social, educational and organizational psychologies and geography. The findings of the present study add a new dimension to this research by focusing on place cognition and how it develops.
2. This area is in need of learning relative to children's hierarchical structure of place categories as well as in the content and characterization of these categories. and Hemenway chose to focus on the structure of adult place categorization in order to understand more about the way knowledge about places is organized. This dissertation similarly chose to focus on the structural aspects of place categorization in order to provide a "framework" within which to examine similarities and differences between children. It was felt that the content and characterizations of children's categories could be better understood once the organization of their knowledge was better understood.

3. In the past ten years the physical environment has also grown to be a significant research area of developmental psychology. Yet, most of this theory and research has focused on the spatial relationship of small-scale phenomena in the environment. Very little progress has been made in understanding the content of the large-scale environment and how it is named or categorized.
4. Looking at context is necessary for a full understanding of conceptual and categorical knowledge of even young children (Nelson & Nelson, 1983; Nelson, 1985; Rosch et al., 1976). Findings can contribute to an understanding of the object-context relationship.
4. Extension to children of a methodological framework used with adults in a variety of areas may shed light on the development of categorization processes in general.

On a more topical level there is currently great concern in the United States concerning children's limited understanding of geography.

GOALS AND EXPECTATIONS

The purpose of this dissertation study was to provide a systematic and controlled exploration into how children at various ages categorize and give meaning to the physical environment. The developmental primacy of a "basic level" of categorization of objects has been found with children by many investigators, notably Rosch et al. (1976). They have found that the ability to categorize at other levels of abstraction develops subsequently. A taxonomy of "environmental scenes" (i.e., places) with a preferred level of abstraction has been established for adults by Tversky and Hemenway (1983). This dissertation explored the development of place categorization in children ages 5-, 8-, and 12-years, and compared the findings with the research on adult place categorization.[1]

There were two phases to this study. The first phase involved the generation of place categories. The second phase involved the generation of attributes and activities associated with the place categories at three different levels of abstraction: Superordinate, basic and subordinate.

The purpose of the first phase was to generate child-defined sets of exemplars for superordinate level place categories. After the most frequently generated categories were ascertained for each age

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[1]Travel experience was originally intended to be a within subjects variable. However, it was not possible to find enough children without travel experience, particularly at 12-years of age. Therefore, it was omitted from this research.

and gender group, the same children generated subordinate level instances.

Predicted Outcomes

Based on previous findings that categorization schemes vary with age and/or experience, the following outcomes were predicted:

1. Children were expected to produce a taxonomy of place categories similar in structure to the adult taxonomy; however, its content was expected to be different.
2. At the basic level of place categorization, the number of members generated by children was expected to increase with age.
3. With age, place categories at the basic level were expected to become better defined and more agreement among children within age groups as to which category members belong in each category was expected.
4. Idiosyncratic responses and diversity of members within each category were expected to decrease at the basic level.
5. Past research in taxonomic development and categorization has not indicated significant differences between girls and boys. However, environmental behavior research has found differences between the genders in spatial cognition and use of space. Therefore, gender was included as a variable to uncover possible differences in categorical content, degree of agreement and diversity.

6. The most frequently generated basic level place category for Indoors and Outdoors was expected to differ between age groups.
7. Findings for subordinate level category generation were expected to produce the same overall trends as the basic level. However, due to the late acquisition of subordinate level categorization abilities, the number of subordinates generated by children was expected to be much lower than the number of basic level instances. This would especially be the result with the youngest children in particular who have only been able to sort taxonomically at the basic level in past research (Rosch et al, 1976). Furthermore, it was expected that the youngest children would show little agreement and a high degree of diversity on typical subordinate level members.

The second phase of the research investigated the representative list of attributes and activities that children at each age level apply to scene categories at each level of abstraction. In general, it was expected that with age more attributes would be noticed, the functions of items changed, different activities engaged in or learned of and subcategories formed. More specifically, children were expected to differ between and within age groups as follows:

1. The number of attribute and activity norms generated for basic level and subordinate level instances was expected to be greater than the number generated for superordinate level categories

based on the lower cue validity of superordinates (fewer shared attributes).

2. The number of attributes and activities generated for superordinate, basic and subordinate level instances was expected to increase with age.
3. Degree of agreement on the attributes and activities associated with places was expected to increase with age.
4. The diversity of attributes and activities associated with place categories was expected to decrease with age.
5. Based on the salience of function and activity in defining concepts and categories, it was expected that children at all ages would generate a greater number of activities than attributes. Degree of agreement was expected to be higher for activities than attributes and diversity was expected to be less.

CHAPTER II

METHOD

Phase 1. Generation of Basic Level Place Categories

Subjects. Subjects were 120 lower-middle to middle class, Hispanic and Black children from an elementary school in East Harlem. Acceptance to the school was based on an interview with the child and parents and was designed to achieve a mix of personality types, and intellectual levels and interests as well as a high degree of parental involvement. Extensive pilot work for this dissertation in a variety of schools and locations found no evidence to support differences in performance between these children and children in suburban New Jersey, Westchester and the Upper West Side of Manhattan, although differences in category content may be expected.

The children were 40 kindergartners, 40 third graders and 40 sixth graders. In each group, one-half of the children were females and one-half were males. The mean age for each group respectively was: 5 years, 4 months; 8 years, 6 months; and, 11 years, 5 months.

Stimuli. The stimuli for this phase of the research were the superordinate level categories "indoors" and "outdoors". These superordinates were used in order to be consistent with the Tversky and Hemenway (1983) study with adults. According to Tversky and Hemenway, "indoors" and "outdoors" come close to being mutually exclusive and jointly exhaustive of place categories.

Procedure. Interviews were conducted in a small, quiet area separate from the classrooms. Each interview began with a "warm-up" discussion in order to make the child feel comfortable and to set the stage for the line of questioning. This warm-up was as follows:

> I've been talking to lots of children about different kinds of places. I'm interested in knowing about the different kinds of places you know about. Can you tell me about a place you've been to lately?
> [Child responds]
> So you went to _____. Is that a kind of "indoors" or "outdoors" place? [If the child mentioned both an indoors and an outdoors kind of place, the previous question was repeated]. So you also went to _____. Is that a kind of indoors or outdoors place? [The child's "indoors" and "outdoors" places were repeated]. So _____ is a kind of "indoors" place and _____ is a kind of "outdoors" place.

Each child was then presented with both of the superordinates "indoors" or "outdoors", one at a time, in varying order, and asked to, "Tell me all the kinds of "indoors" /"outdoors" places you can think of". The child was prompted to give more items and was allowed to continue responding until she/he could not think of any more places. Unsystematic verbal reinforcement was given to all children. All responses were tape recorded and transcribed in the order in which they were given.

Phase 2. Generation of Subordinate Level Place Categories

Subjects. Subjects were the same 120 children (40 kindergartners, 40 third graders, 40 sixth graders) who generated the basic level categories. This second phase took place approximately

one month later.

Stimuli. The stimuli in this phase were the most frequently reported "indoors" and "outdoors" responses of each age group for a total of six basic level categories. The three "indoors" places used in this phase were house, school and store. The three "outdoors" places were park, beach and playground.

Procedure. Interviews were again conducted in the same quiet area separated from the classrooms. The three "indoors" and three "outdoors" basic level categories were presented to each child. Order of presentation was chosen at random and separately for each child. Each child was asked to, "Tell me all the kinds of _____ (e.g., houses; parks) you can think of". Similar to the first phase, each child was prompted to give more items and was allowed to continue responding until he could not think of any more places. Unsystematic verbal reinforcement was again given to all children. Responses were tape recorded and transcribed in the order in which they were given.

Phase 3. Generation of Attribute and Activity Norms

Subjects. Subjects were 360 children from the same school in East Harlem. These children did not include the 120 children who generated the basic level and subordinate level categories. There were 120 kindergartners, 120 third graders and 120 sixth graders. In each group, one-half of the children were females and one-half were males. The mean age for each group respectively was: 5 years, 3 months; 8 years, 5 months; and, 11 years, 6 months.

Stimuli. The stimuli for this phase of the research were: The two superordinate level categories, indoors and outdoors; the six basic level categories, house, school, store, park, beach and playground; and, the eighteen subordinate level categories which were the most frequently generated responses of each age group for each basic level category. These were: Big house, small house, building, catholic school, high school, nursery school, grocery store, candy store, toy store, big park, small park, amusement park, sandy beach, beach with big waves, small beach, big playground, small playground and playground in a park. The 26 categories used in this phase are represented in Figure 2.

Pre-testing with children suggested that children could be attentive to and equally responsive to approximately ten categories. Therefore, each child was given nine categories representing the three levels of categorization: One superordinate, one basic level "indoors" category and one basic level "outdoors" category, and three subordinate level "indoors" categories (one house, one school, one store) and three subordinate level "outdoors" categories (one park, one beach, one playground).

The most frequently generated categories at each level of categorization were treated as equal representatives of their level. However, in order to use each category equally, three groups of nine categories were randomly constructed. These groups of categories are shown in Table 1. Presentation of the three groups was distributed across the 120 children per age group, one group for each of 40 children of each age. Children were randomly assigned to groups.

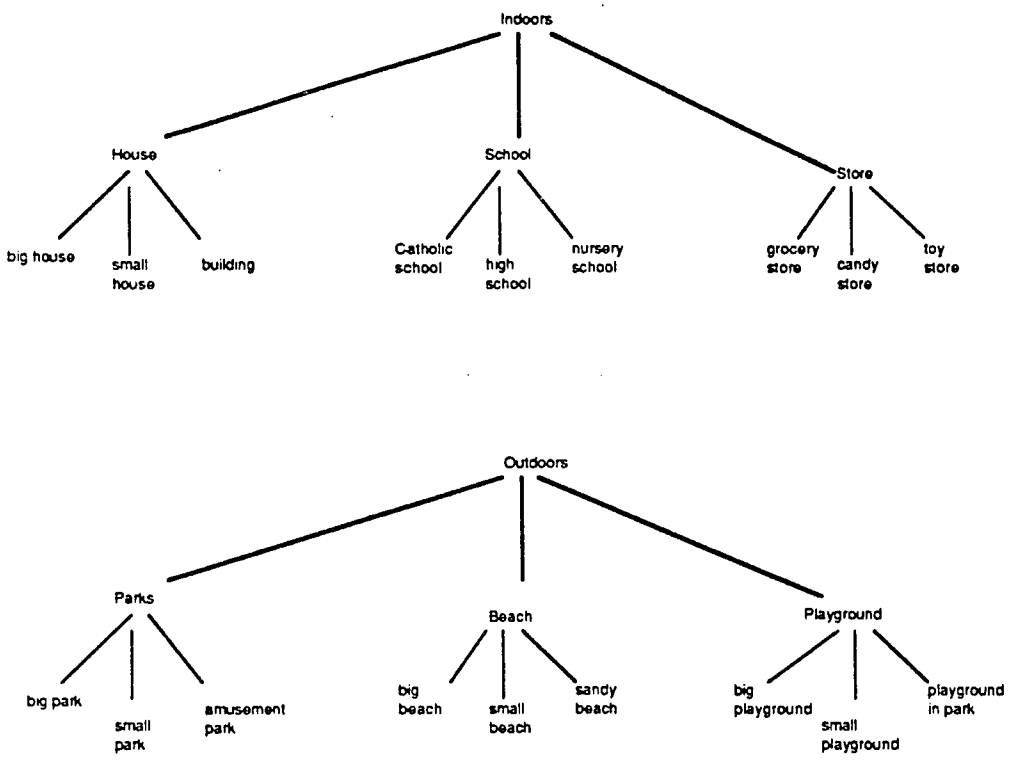

Figure 2. Hierarchy of places generated by children in Phases 1 and 2.

Procedure. Each of the 360 children was interviewed on two separate occasions. During one of the two sessions children were given one of the three groups of categories, each category member one at a time and asked to generate attributes by the following questions, "How would a person know if he/she was at a _____?. What would he/she see?" During the other session the same children were given one of the three groups of categories, each category member one at a time, and asked to generate activities by the following question, "What do people do at _____?". One-half of the children were asked to first generate attributes and one-half were asked to first generate activities. Children were randomly assigned to order condition.

Responses were tape-recorded and transcribed in the order in which they were given.

TABLE 1
GROUPS OF ITEMS USED IN ATTRIBUTE GENERATION PHASE

	Group 1	Group 2	Group 3
Superordinate	—Indoors	—Outdoors	—1/2 Indoors —1/2 Outdoors
Basic	—School —Park	—Store —Beach	—House —Playground
Subordinate	—Building —Nursery school —Candy store —Big park —Big beach —Playground in a park	—Big house —Catholic school —Toy store —Small park —Sandy beach —Small playground	—Small house —High school —Grocery store —Amusement park —Small beach —Big playground

CHAPTER III

RESULTS

Phase 1. Generation of Basic Level Place Categories

Number of Categories Generated. Each of the 120 children gave responses to both Indoors and Outdoors. Table 2 shows the mean number of responses per category by age and gender. Results were analyzed in a 3 (age) x 2 (gender) x 2 (category: Indoors, Outdoors) analysis of variance with repeated measures on the category variable.

As expected, there was a main effect of age ($F(2,238) = 39.81$, $p < .001$. Post hoc tests revealed significant differences between all age groups indicating that the ability to generate basic level place categories increased with age.[2]

There was no significant difference between girls and boys[3] and no significant difference in the number of responses for the superordinates (Indoors and Outdoors). It can be seen in Table 2 that there was little variability between the two superordinates, on the number of basic level category members associated with them.

Degree of Agreement on Category Membership. Two measures were used to index the degree of agreement among children on Indoors and Outdoors category membership. The first measure was the Index of

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[2]Duncan's Multiple-Range test was used to test all post hoc comparisons between means in this study.

[3]No gender differences were found in any of the analyses in this study. Therefore, data for girls and boys were combined in all tables.

TABLE 2
MEAN NUMBER OF RESPONSES PER CATEGORY

	N	Indoors	Outdoors	Means
5-years	40	3.00 (.82)	2.93 (.77)	2.97
8-years	40	4.65 (.72)	4.00 (.91)	4.33
12-years	40	6.75 (1.07)	6.40 (.69)	6.58
Means	120	4.80	4.44	4.63

Commonality (IC). The IC is the ratio of the frequency of the three most common responses within a category to the total number of responses given by all subjects in each age and gender group. As shown in Table 3, the IC ranged from .537 for Indoors among 5-year olds to .666 for Indoors among 12-year olds. This indicates that at all ages there was relatively strong agreement on typical Indoors and Outdoors places. For each age x gender group the three most frequent responses equalled more than one-half of the total responses given by that group.

The IC for each group was analyzed, using the Test for Significance of Difference between Proportions. Contrary to expectation, analysis revealed no significant difference between ages, genders or superordinate level categories. This indicates that 5-year olds, 8-year olds and 12-year olds agree among themselves on typical category members to a similar degree. Additionally, girls and boys agree to the same extent.

The second measure used to index degree of agreement among children was the Type/Token Ratio (TTR). This measure indexes the diversity of responses within each category. It is the ratio of the number of different responses given for each category to the total number of responses in that category given by each age and gender group. The higher the proportion, the greater the diversity.

As shown in Table 4, the TTR ranged from .346 for Outdoors among 5-year olds to .152 for Indoors among 12-year olds. Overall, the Indoors and Outdoors categories of 5-year olds showed the highest

TABLE 3
INDEX OF COMMONALITY: BASIC LEVEL CATEGORIES

	N	Indoors	Outdoors	Means
5-years	40	.537	.569	.553
8-years	40	.559	.533	.546
12-years	40	.666	.640	.653
Means	120	.587	.581	.584

TABLE 4
TYPE/TOKEN RATIO: BASIC LEVEL CATEGORIES

	N	Indoors	Outdoors	Means
5-years	40	.337	.346	.342
8-years	40	.304	.312	.308
12-years	40	.152	.161	.157
Means	120	.264	.273	.269

diversity of membership and the categories of 12-year olds showed the least.

The TTRs of each age and gender group were compared using the Test for Significance of Difference between Proportions. As expected, analyses showed a significant difference between 12-year olds and 5-year olds ($Z = 2.72$, $p < .01$) and between 12-year olds and 8-year olds ($Z = 2.29$ $p < .01$). Unexpectedly, there was no significant difference between 5-year olds and 8-year olds. These results indicate that diversity of categories decreases with age after 8-years of age. Although the mean number of places per category of 5-year olds and 8-year olds are smaller than the mean number of places per category of 12-year olds (Table 2), they show more diversity within the group. No gender differences were found.

Most Frequently Generated Basic Level Place Categories. This study was designed to use the most frequently generated basic level Indoors and Outdoors category member of each age group (for a total of six basic level categories) in the next phase of the research. Unexpectedly, inspection of the category members for Indoors and Outdoors revealed that each age and gender group had the same most frequent Indoors (house) and Outdoors place category (park). Furthermore, the three most frequently generated basic level categories of each age group for each superordinate were the same. Table 5 shows the percentage of children in each age group who generated these responses.

TABLE 5
PERCENTAGE OF RESPONSES FOR THE MOST FREQUENTLY GENERATED BASIC LEVEL CATEGORIES

INDOORS

CATEGORY	5-Years (N = 40)	8- Years (N = 40)	12-Years (N = 40)	Means (N = 120)
House	78	80	90	83
School	50	60	48	53
Store	45	48	50	48
Means	58	63	63	61

OUTDOORS

CATEGORY	5-Years (N = 40)	8- Years (N = 40)	12-Years (N = 40)	Means (N = 120)
Park	53	83	63	66
Playground	45	38	33	39
Beach	38	30	38	35
Means	45	50	45	47

Note: Means: 5-years, 2.33; 8-years, 3.41; 12-years, 4.53

"House" was the most frequently generated Indoors place category in each age group. "School" and "store" were either the second or third most popular categories. "Park" was the most frequently generated Outdoors place category in each age group with "playground" and "beach" either second or third. Other Indoors and Outdoors place categories generated by each age group are listed in Appendix I.

Most of the categories listed in Appendix I were generated by both girls and boys. However, several categories (marked*) emerged among 12-year old boys only. These were: Boys Club, skateboard track, clubhouse, arcade, basketball court and stadium.

Phase 2. Generation of Subordinate Level Place Categories

Number of Categories Generated. The same 120 children generated subordinate level place categories for each of the six basic level place categories. Table 6 shows the mean number of responses per category by age and gender. Results were analyzed in a 3 (age) x 2 (gender) x 2 (category: Indoors basic level, Outdoors basic level)[4] repeated measures analysis of variance.

As hypothesized, analysis revealed a main effect of age ($F(2,234) = 81.76$, $P < .001$) showing that number of subordinate level place categories increased with age.

There was also a main effect of category ($F(2,234) = 44.59$, $p < .001$; means: 4.70 for Indoors basic level categories; 3.73 for

[4]There were no differences between the three Indoors intermediate categories and between the three Outdoors intermediate categories. Data were therefore combined within Indoors and within Outdoors.

TABLE 6
MEAN NUMBER OF SUBORDINATE RESPONSES
BY BASIC LEVEL CATEGORY

INDOORS

	N	House	School	Store	Means
5- years	40	2.20 (.84)	3.28 (.89)	2.15 (.19)	2.54
8-years	40	4.18 (.81)	4.40 (1.06)	4.30 (1.04)	4.29
12-years	40	4.88 (.79)	5.75 (.84)	5.48 (1.18)	5.37
Means	120	3.75	4.48	3.98	4.07

OUTDOORS

	N	Park	Playground	Beach	Means
5- years	40	2.40 (.30)	2.15 (.66)	1.80 (.79)	2.12
8-years	40	2.75 (.81)	2.75 (.78)	1.95 (.71)	2.48
12-years	40	3.78 (.37)	3.48 (.48)	3.70 (.63)	3.65
Means	120	2.98	2.79	2.48	2.75

Note: Means: 5-years, 2.33; 8-years, 3.41; 12-years, 4.53

Outdoors basic level categories) indicating that children generated significantly more subordinate level place categories for Indoors than Outdoors places.

An interaction of age by category was also found ($F(2,468) = 4.96$, $p < .005$). This interaction showed that the size of the 8-year olds' and the 12-year olds' subordinate level categories differed between Indoors and Outdoors (means: 4.30 for 8-year old Indoors and 2.49 for 8-year old outdoors; 5.37 for 12-year old Indoors and 3.68 for 12-year old Outdoors, $p < .05$) but the 5-year olds' categories did not differ (means: 2.54 for 5-year old Indoors and 2.12 for 5-year olds Outdoors). No differences were found between girls and boys.

Consistent with an hypothesis of this study, a comparison of the mean number of members per basic level place category and the mean number of members per subordinate level place category showed that overall, significantly more basic level places were generated ($t = 3.21$, $p < .01$; means: 4.62 per basic level category; 3.73 per subordinate level category).

Degree of Agreement on Category Membership. The Index of Commonality (IC) was computed for each age and gender group on each basic level category to determine the extent to which children agreed on the subordinate level members of each basic level category. As shown in Table 7, the IC ranged from .292 for Outdoors place categories among 5-year olds to .573 for Indoors place categories among 12-year olds. In particular, the IC was lowest for "Beach" (.234) among 5-year olds

TABLE 7
INDEX OF COMMONALITY: SUBORDINATE LEVEL CATEGORIES

INDOORS

	N	House	School	Store	Means
5- years	40	.326	.313	.365	.335
8-years	40	.406	.410	.482	.433
12-years	40	.552	.574	.593	.573
Means	120	.428	.432	.480	.447

OUTDOORS

	N	Park	Playground	Beach	Means
5- years	40	.321	.320	.234	.292
8-years	40	.437	.407	.362	.402
12-years	40	.550	.535	.471	.519
Means	120	.436	.421	.356	.404

and highest for "Store" (.593) among 12-year olds, indicating that there was relatively little agreement on the most typical kinds of beaches and strong agreement on typical kinds of stores.

The ICs for each age and gender group and each category (Indoors, overall and Outdoors, overall) were compared using the Test for Significance of Difference between Proportions. As expected, analyses showed a significant difference between ages ($Z = 2.36$, for 5-year olds vs. 8-year olds, $p < .05$; $Z = 5.17$, for 5-year olds vs. 12-year olds, $p < .01$; $Z = 2.80$, for 8-year olds vs. 12-year olds, $p < .01$). Thus, at the subordinate level agreement on typical place category members increased with age. This is different from the basic level where all age groups agreed to the same extent on typical members (Table 3).

No gender differences were found and no differences in the degree of agreement for Indoors vs. Outdoors subordinate level place members were found.

The ICs at the subordinate level were compared to the ICs at the basic level using the test for significance of difference between proportions. As expected, the 5-year olds and the 8-year olds showed significantly more agreement on typical basic level place members than they did on subordinate level place members ($Z = 3.8$ for 5-year olds, $p < .01$; $Z = 2.06$ for 8-year olds, $p < .05$). Unexpectedly, the 12-year olds did not differ in their degree of agreement between typical basic level and subordinate level place members. This suggests that with age subordinate level place categories become as well-defined as basic place categories.

Children across ages showed significantly more internal agreement on typical basic level place categories than on subordinate level place categories ($Z = 3.06$, $p < .01$).

A Type/Token Ratio (TTR) was computed for each age and gender group and for each place category to determine the diversity of subordinate level members for each basic level category. Table 8 shows that the TTR ranged from .464 for Outdoors places among 5-year olds to .315 for Indoors places among 12-year olds. In particular, the TTR was highest for "Beach" (.501) among 5-year olds and lowest for "School" (.285) among 12-year olds indicating wide diversity in typical types of beaches and relatively little diversity in typical types of schools.

The Test of Significance of Difference between Proportions was used to compare the TTRs of each age and gender group and Indoors and Outdoors categories. A significant difference was found between 5-year olds and 12-year olds ($Z = 2.60$, $p < .01$). As expected, the subordinate level categories of 5-year olds were more diverse than those of 12-year olds as well as being smaller (Table 5) and less well-defined (Table 6). Contrary to the expectations, 8-year olds did not differ significantly from either the 5-year olds or the 12-year olds (means: .457 for 5-year olds; .402 for 8-year olds; .339 for 12-year olds). While not significant, these means suggest that 8-year olds' subordinate level place categories are less diverse than those of 5-year olds and more diverse than those of 12-year olds. Thus, it appears that there is a tendency from 5-years through 8-years to 12-years toward decreasing diversity.

TABLE 8
TYPE/TOKEN RATIO: SUBORDINATE LEVEL CATEGORIES

INDOORS

	N	House	School	Store	Means
5- years	40	.423	.434	.494	.450
8-years	40	.346	.395	.410	.384
12-years	40	.302	.285	.355	.314
Means	120	.357	.371	.420	.383

OUTDOORS

	N	Park	Playground	Beach	Means
5- years	40	.482	.410	.500	.464
8-years	40	.460	.394	.414	.423
12-years	40	.407	.302	.381	.363
Means	120	.450	.369	.432	.417

No differences in degree of diversity were found between girls and boys. There were also no differences between Indoors and Outdoors categories.

The TTRs at the subordinate level were compared to the TTRs at the basic level using the Test for Significance of Difference between Proportions. Consistent with the expectations of this study, for all ages, categories at the basic level were less diverse than at subordinate level ($Z = 2.30$ for 5-year olds, $p < .05$; $Z = 1.97$ for 8-year olds, $p < .05$; $z = 2.94$ for 12-year olds, $p < .01$). Thus, although subordinate level place categories become as well-defined (IC) as basic level categories by 12-years of age, they remain more diverse.

Across ages, basic level place categories were significantly less diverse than subordinate level categories ($Z = 2.57$, $p < .05$).

Most Frequently Generated Subordinate Level Place Categories. The next phase of this study, Generation of Attributes and Activities for place categories at different levels of abstraction, required superordinate, basic level and subordinate level categories to be generated by each age group. The three most frequently generated subordinate level place categories for each of the six basic level categories were used. Figure 3 represents the 18 subordinate level categories created in this way.

Unexpectedly, the most notable response was the use by all age and gender groups of "big" and "small" as subordinate level categories. For example, big house, small house, big park, small

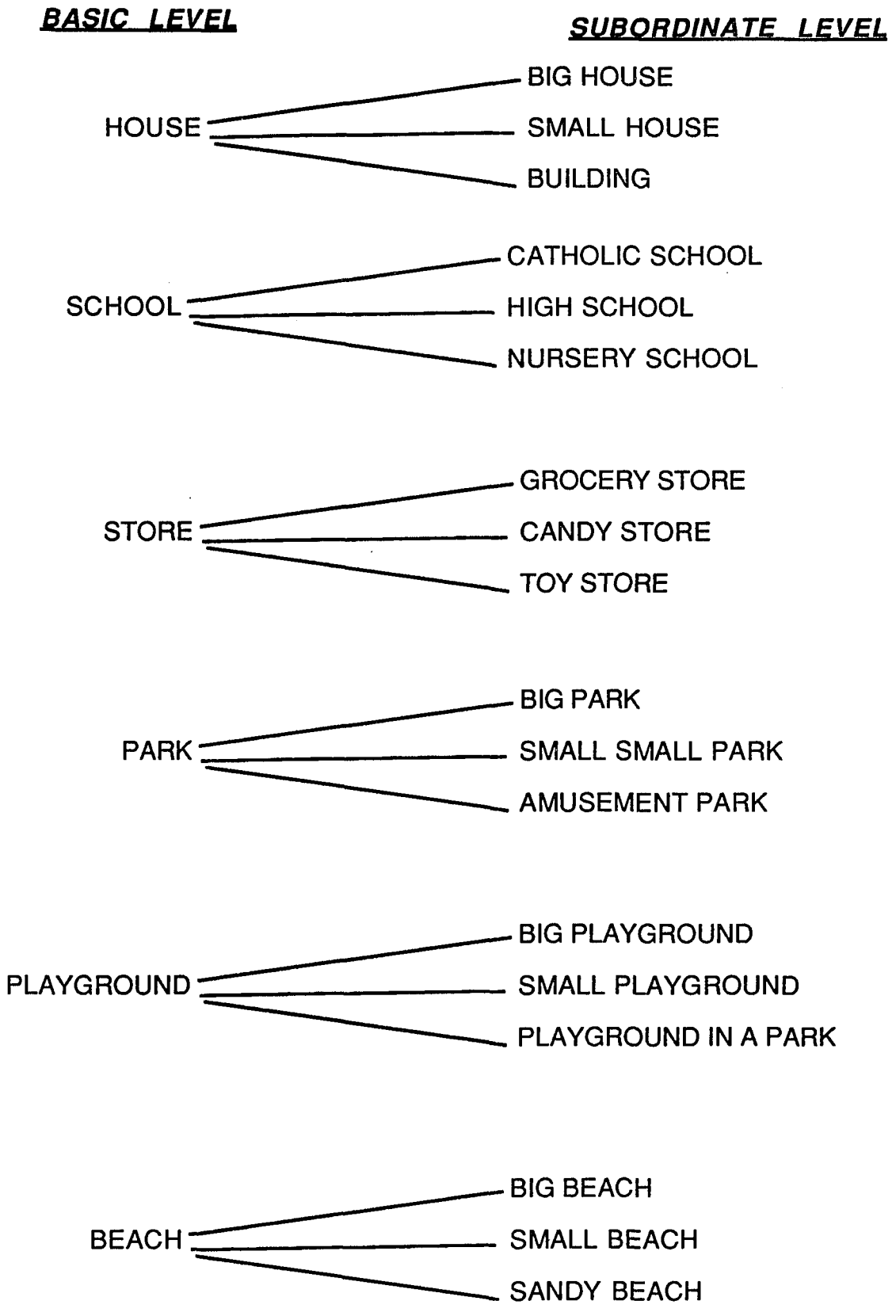

FIGURE 3. THREE MOST FREQUENTLY GENERATED SUBORDINATE CATEGORIESFOR EACH OF SIX BASIC LEVEL CATEGORIES

park, big playground, small playground, big beach, small beach were the most frequently generated subordinates for all age groups for the basic level place categories of house, park, playground and beach. Proper names were also given by many children as subordinate level place categories. These responses were probed further as to what kinds of places they were. Children often reported that they were "big" and "small" places (e.g., Central Park is a big park; Miami Beach or Coney Island are big beaches). The proper names, however, were retained for purposes of the categorization and analyses and were not counted as "big" and "small". Table 9 shows the percentage of children in each age group who generated the subordinate level place categories used in the generation of attributes and activities phase of the research.

This study was designed to use each age group's most frequently generated subordinate level category of each basic level category. However, in some instances the same subordinates were generated most frequently by all age groups, and in other instances several subordinates were generated with equal frequency. Therefore, the frequencies of each subordinate were averaged across the three age groups, and the three most frequently generated for each basic level category were used.

All the subordinates generated by each age group are listed in Appendix II.

TABLE 9
PERCENTAGE OF RESPONSES FOR THE MOST FREQUENTLY GENERATED SUBORDINATE LEVEL PLACE CATEGORIES

INDOORS

CATEGORY	5-Years (N = 40)	8- Years (N = 40)	12-Years (N = 40)	Means (N = 120)
Big House	43	68	52	54
Small House	56	75	78	70
Building	71	75	75	74
Catholic School	64	23	18	35
High School	30	32	48	37
Nursery School	12	65	21	33
Grocery Store	50	73	75	66
Candy Store	26	33	63	41
Toy Store	28	26	63	39
Means	42	52	55	50

OUTDOORS

CATEGORY	5-Years (N = 40)	8- Years (N = 40)	12-Years (N = 40)	Means (N = 120)
Big Park	63	83	50	65
Small Park	68	33	60	54
Amusement Park	8*(15)	10*(29)	48	22
Big Playground	55	75	50	60
Small Playground	58	75	33	55
Playground in a Park	3	5	45	18
Big Beach	30	48	20	33
Small Beach	28	65	18	37
Sandy Beach	10	33	20	21
Means	36	47	38	40

*Some children generated proper names (Rye Playland; Action Park) but did not call them "amusement parks" when probed. Only those who did use "amusement" were included in percentage. Percentage of those using proper names is in parentheses ( ).

Note: Means: 5-years, 39%; 8-years, 50%; 12-years, 47%

Phase 3. Generation of Attributes and Activities Associated with Place Categories at Three Levels of Abstraction

Number of Attributes Generated. Children at each age level (N = 120) generated attributes for superordinate, basic and subordinate level place categories. Table 10[5] shows the mean number of attributes per category (for each level of categorization) by age and gender. Results were analyzed in a 3 (age) x 2 (gender) x 3(level of categorization: Superordinate, basic, subordinate) x 2 (category: Indoors, Outdoors) repeated measures analysis of various.

As expected, a main effect of age was found ($F(2,357) = 76.32$, $p < .001$). Post hoc tests revealed a significant difference between all ages indicating that the number of attributes associated with place categories, overall, increases with age.

There was also an expected main effect for level of categorization ($F(2,357) = 27.31$, $p < .001$). Post hoc tests revealed that the number of attributes generated for the basic and subordinate level categories was significantly greater than the number generated for the superordinate level (means: 2.94 for superordinates; 3.67 for basics; 4.09 for subordinates, $p < .05$). While the number of basic level attributes was larger than the number of subordinate level attributes, the difference was not significant.

An interaction of age by level of categorization by category was found ($F(4,357) = 2.96$, $p < .05$). Unexpectedly, the 12-year old Outdoors categories did not follow the pattern of significantly fewer

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[5]Tables 10, 12, 13, 14, 15 and 16 are presented in more detail in Appendix V.

TABLE 10
MEAN NUMBER OF ATTRIBUTES GENERATED FOR EACH LEVEL OF CATEGORIZATION

INDOORS

	N	Superordinate	Basic	Subordinate	Means
5- years	120	1.68 (1.27)	3.42 (.92)	2.74 (2.00)	2.61
8-years	120	2.92 (1.56)	4.19 (.89)	3.68 (1.91)	3.60
12-years	120	4.00 (1.81)	5.87 (1.66)	5.43 (1.85)	5.10
Means	360	2.87	4.49	3.95	3.77

OUTDOORS

	N	Superordinate	Basic	Subordinate	Means
5- years	120	2.11 (1.72)	3.09 (1.61)	3.49 (1.67)	2.90
8-years	120	3.75 (1.90)	3.79 (1.99)	4.26 (2.31)	3.93
12-years	120	3.73 (1.66)	4.77 (1.76)	5.71 (1.74)	4.73
Means	360	3.20	3.88	4.49	3.85

attributes at the superordinate level than at other levels. In this instance, both the superordinate and basic levels had fewer attributes associated with them than the subordinate level did.

No differences were found between genders or between categories (Indoors; Outdoors).

Types of Attributes Generated. Inspection of the attributes associated with places revealed four types of 'attributes' at each level of abstraction: Other places (e.g., offices, stores, rooms), parts/people (e.g., roof, floor, teachers), properties (e.g., quiet, crowded, dirty), activities (e.g., playing, buying food, swimming). Table 11 shows the percentage of each type of attribute for each age group at each level of abstraction. It can be seen from Table 11 that the attributes associated with superordinate level places are primarily other places and parts/people. At the basic level, associated attributes are primarily parts/people and a small percentage of places and activities. Very few properties were given by children as attributes associated with basic level place categories. At the subordinate level, parts/people were again the most frequently associated types of attributes for all age groups. A major difference, however, was that many parts/people were qualified by properties or adjectives (e.g., older children, bigger rooms, little swings). These qualified parts/people are listed as a separate percentage in the subordinate listings in Table 10.

Number of Activities Generated. Table 12 shows the mean number of activities per category (for each level of categorization) by age and gender. Results were analyzed in a 3 (age) x 2 gender) x 3

TABLE 11
PERCENTAGE OF TYPES OF ATTRIBUTES GENERATED FOR PLACES AT THREE LEVELS OF ABSTRACTION

	Superordinate			Basic			Subordinate			Total
	5-years	8-years	12-years	5-years	8-years	12-years	5-years	8-years	12-years	
Places	20	21	36	10	11	13	8	6	3	14
Parts/People	73	67	54	81	77	70	47 <33*	44 <33*	45 <33*	62
Properties	0	0	6	0	2	4	5	8	12	4
Activities	7	12	3	9	10	13	7	9	11	9

*These percentages represent parts/people that are qualified by adjectives or properties

TABLE 12
MEAN NUMBER OF ACTIVITIES GENERATED FOR EACH LEVEL OF CATEGORIZATION

INDOORS

	N	Superordinate	Basic	Subordinate	Means
5- years	120	1.77 (.79)	2.74 (.81)	2.66 (1.01)	2.39
8-years	120	2.06 (.81)	3.62 (.71)	3.46 (1.13)	3.05
12-years	120	3.75 (1.03)	4.36 (.99)	4.58 (1.21)	4.23
Means	360	2.53	3.57	3.57	3.22

OUTDOORS

	N	Superordinate	Basic	Subordinate	Means
5- years	120	1.07 (.72)	2.48 (.63)	2.60 (.91)	2.90
8-years	120	2.10 (.77)	2.95 (.68)	3.59 (1.32)	3.93
12-years	120	3.24 (1.11)	4.22 (.74)	5.17 (1.32)	4.73
Means	360	2.14	3.22	3.79	3.85

(level of categorization) x 2 (category) repeated measures analysis of variance.

Consistent with the hypothesis of this study, results showed a main effect of age ($F(2,357) = 47.91$, $p < .001$; means: 2.22 for 5-year olds; 2.96 for 8-year olds; 4.22 for 12-year olds). Post hoc tests revealed significant differences between all age groups indicating an increase with age in number of activities associated with place categories.

Similar to results for attributes, a main effect of level of categorization was found ($F(2,357) = 31.05$, $p < .001$). Post hoc tests revealed that significantly fewer activities were associated with superordinate level place categories than with basic level and subordinate level categories (means: 2.13 for superordinates; 3.40 for basic; 3.67 for subordinates).

An interaction of age by level of categorization by category was found ($F(4,357) = 2.51$, $p < .05$; means: 3.24 for 12-year old Outdoors superordinates; 4.22 for 12-year old Outdoors basic; 5.17 for 12-year old Outdoors subordinates). The number of activities associated by 12-year olds with place categories increases from superordinate to basic to subordinate level. This was the only instance in which the subordinate level had significantly more activities associated with it than the basic level did.

Similar to findings with attributes, no gender or category (Indoors; Outdoors) differences were found.

Contrary to expectations, a test of the difference between the number of attributes associate with place categories versus number of

activities associated with them was significant ($t = 3.13$, $p < .01$) indicating, overall, that children associate a greater number of attributes than activities with place categories.

Degree of Agreement on Attributes (IC). The Index of Commonality (IC) was measured for each age and gender group and for Indoors and Outdoors categories at each level of abstraction. As shown in Table 13, the IC ranged from .158 for 5-year olds superordinate level Indoors category to .691 for 12-year olds basic level Outdoors categories. This indicates that there was little agreement among 5-year olds on the attributes associated with superordinate level Indoors categories and there was strong agreement among 12-years on the attributes associated with basic level Outdoors categories.

The ICs were compared using the Test for Significance of Difference between Proportions to look for differences between age groups, genders, levels of categorization and Indoors/Outdoors categories. As expected, analyses indicated a significant difference between ages ($Z = 4.09$, $p < .01$ for 5-year olds vs. 8-year olds; $Z = 7.09$, $p < .01$ for 5-year olds vs. 12-year olds; $Z = 3.00$, $p < .01$ for 8-year olds vs. 12-year olds) indicating that with age there is an increase in agreement on attributes associated with place categories.

As expected, a significant difference between levels of categorization was found ($Z = 6.28$, $p < .01$ for superordinate vs. basic; $Z = 16.31$, $p < .01$ for superordinate vs. subordinate). There

TABLE 13
INDEX OF COMMONALITY—ATTRIBUTES

INDOORS

	N	Superordinate	Basic	Subordinate	Means
5- years	120	.158	.258	.288	.235
8-years	120	.238	.300	.369	.302
12-years	120	.281	.431	.482	.398
Means	360	.226	.330	.380	.312

OUTDOORS

	N	Superordinate	Basic	Subordinate	Means
5- years	120	.241	.571	.566	.459
8-years	120	.384	.660	.646	.563
12-years	120	.410	.691	.680	.594
Means	360	.345	.641	.631	.539

was less agreement among children at all ages[6] on attributes associated with superordinate level place categories. In other words, superordinate level place categories were less well-defined for all age groups than were basic and subordinate level categories.

Results showed that Outdoors place categories were better defined than were Indoors place categories ($Z = 12.94$, $p < .01$). This was true for all levels of abstraction ($Z = 2.48$ for superordinate Indoors vs. Outdoors; $Z = 13.10$, $p < .01$ for basic Indoors vs. Outdoors; $Z = 28.06$, $p < .01$ for subordinate Indoors vs. Outdoors). There was more agreement among children at all ages on attributes associated with Outdoors categories than Indoors categories. No gender differences were found.

Degree of Agreement on Activities (IC). The IC was again measured for each age and gender group and for Indoors and Outdoors categories at each level of abstraction. As shown in Table 14, the IC for activities ranged from .270 for 5-year olds on the superordinate level Indoors category to .646 for 12-year olds on the subordinate level Outdoors categories. Note that the range of IC ratios was not as great for activities as for attributes.

The ICs were compared using the Test for Significance of Difference between Proportions. Analyses indicated a significant difference between 5-year olds and 12-year olds and 8-year olds and 12-year olds ($Z = 6.00$, $p < .01$ for 5-year olds vs. 12-year olds; $Z =$

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[6]Analysis at each age level showed significance at all ages. Therefore, the mean across ages was used to avoid listing Multiple Z - scores separately.

TABLE 14
INDEX OF COMMONALITY—ACTIVITIES

INDOORS

	N	Superordinate	Basic	Subordinate	Means
5- years	120	.270	.423	.406	.366
8-years	120	.311	.465	.485	.420
12-years	120	.350	.514	.544	.469
Means	360	.310	.467	.478	.418

OUTDOORS

	N	Superordinate	Basic	Subordinate	Means
5- years	120	.390	.563	.554	.469
8-years	120	.374	.597	.590	.520
12-years	120	.471	.636	.646	.584
Means	360	.412	.599	.597	.536

4.95, $p < .01$ for 8-year olds vs. 12-year olds). Contrary to the hypotheses of this study 5-year olds and 8-year olds agreed among themselves to the same extent on the activities associated with place categories. The 12-year olds agreed among themselves to a significantly greater extent.

Similar to results with attributes, superordinate level place categories were less well-defined than basic and subordinate level categories relative to activities ($Z = 5.38$, $p < .01$ for superordinate vs. basic; $Z = 5.39$, $p < .01$ for superordinate vs. subordinate). This indicates that there was less agreement among children at all ages on activities associated with superordinate level place categories.

There was also a significantly greater degree of agreement on activities associated with Outdoors place categories at all levels of abstraction ($Z = 6.5$, $P < .01$; $z = 1.98$, $p < .05$ for superordinates; $Z = 3.54$, $p < .01$ for basic; $Z = 5.62$ $p < .01$ for subordinates). Thus, similar to attributes, there was more agreement among children at all ages on activities associated with Outdoors than Indoors categories. No gender differences were found.

The overall IC for activities was compared to the IC for attributes using the Test for Significance of Difference between Proportions. As expected, results showed that there was significantly more agreement on activities associated with place categories than with attributes associated with these categories ($Z = 4.33$, $P < .01$). That is, place categories across all levels of categorization were better defined by the activities associated with

them than by attributes.

Type/Token Ratio: Attributes. The TTR was computed for each age and gender group and for Indoors and Outdoors categories at each level of abstraction. As shown in Table 15, the TTR for attributes ranged from .479 for 5-year olds on the superordinate level Outdoors category to .134 for 12-year olds on subordinate level Outdoors categories. Thus attributes associated with the superordinate level Outdoors categories were quite diverse while those associated with subordinate level Outdoors categories showed relatively little diversity.

The TTRs were compared using the Test for Significance of Difference between Proportions. As expected, analyses indicated a significant difference between all ages ($Z = 3.50$, $p < .01$ for 5-year olds vs. 8-year olds; $Z = 6.45$, $p < .01$ for 5-year olds vs. 12-year olds; $Z = 3.11$, $p < .01$ for 8-year olds vs. 12-year olds). Thus, with age diversity of activities associated with place categories decreased.

Diversity of attributes was greatest at the superordinate level. ($Z = 5.03$, $p < .01$ for superordinate vs. basic; $Z = 6.96$, $p < .01$ for superordinate vs. subordinate). Thus, superordinate level place categories were more diverse for children at all ages than were basic or subordinate level categories.

Outdoors place categories, overall, were less diverse than Indoors place categories ($Z = 2.68$, $p < .01$) for children of all ages. This was true, however, for the basic and subordinate levels of abstraction only ($Z = 2.33$, $p < .05$ for basic; $Z = 3.72$, $p < .01$

TABLE 15
TYPE/TOKEN RATIO—ATTRIBUTES

INDOORS

	N	Superordinate	Basic	Subordinate	Means
5- years	120	.458	.357	.339	.385
8-years	120	.402	.304	.280	.329
12-years	120	.349	.235	.214	.266
Means	360	.403	.299	.278	.327

OUTDOORS

	N	Superordinate	Basic	Subordinate	Means
5- years	120	.479	.304	.297	.360
8-years	120	.411	.211	.198	.273
12-years	120	.374	.148	.134	.219
Means	360	.421	.221	.210	.284

for subordinates). At the superordinate level, Indoors and Outdoors categories showed the same high degree of diversity. No gender differences were found.

Type/Token Ratio: Activities. As shown in Table 16, the TTR ranged from .406 for 5-year olds on the superordinate level Indoors category to .134 for 12-year olds on subordinate level Outdoors categories.

As expected, comparison of TTRs using the Test for Significance of Difference between Proportions showed a significant decrease in diversity of attributes with age ($Z = 4.70$, $p < .01$ for 5-year olds vs. 8-year olds; $Z = 9.11$, $p < .01$ for 5-year olds vs. 12-year olds; $Z = 4.39$, $p < .01$ for 8-year olds vs 12-year olds).

Diversity of activities associated with places was significantly greater at the superordinate level ($Z = 3.21$, $p < .01$ for superordinate level vs. basic; $Z = 4.33$, $p < .01$ for superordinate vs. subordinate). Basic and subordinate level place categories were less diverse for children at all ages.

The overall TTR for activities was compared to the overall TTR for attributes using the test for significance of difference between proportions. As expected, showed that activities associated with place categories were less diverse than the attributes associated with these categories ($Z = 3.91$, $p < .01$).

In sum, a greater number of attributes than activities were associated with place categories at all levels of abstraction for all age groups. However, place categories were better defined in terms

TABLE 16
TYPE/TOKEN RATIO—ACTIVITIES

INDOORS

	N	Superordinate	Intermediate	Subordinate	Means
5- years	120	.406	.314	.297	.339
8-years	120	.350	.257	.224	.277
12-years	120	.255	.178	.156	.196
Means	360	.337	.250	.226	.271

OUTDOORS

	N	Superordinate	Intermediate	Subordinate	Means
5- years	120	.369	.302	.304	.325
8-years	120	.314	.225	.219	.253
12-years	120	.250	.141	.134	.175
Means	360	.311	.223	.219	.251

of activities than attributes and the activities associated with places were less diverse.

Attributes and activities generated by children in each age group are listed in Appendix III and Appendix IV respectively.

SUMMARY OF FINDINGS

Age. At the basic and subordinate levels the size of children's place categories increased with age.

The number of attributes and activities associated with place categories increased with age.

The degree of agreement between children on typical category members of place categories varied between ages at the subordinate level only. With age, categories became better defined.

Agreement on attributes associated with place categories at all levels of abstraction increased with age. Agreement on activities, however, increased at 12 years of age only.

The diversity of categories was less for 12-year olds than for 5- and 8-year olds for basic level place categories. At the subordinate level, the categories of 12-year olds were less diverse than the 5-year olds only.

The diversity of attributes and activities associated with place categories decreased with age.

Gender. There were no significant differences between girls and boys in any phase of this study.

One qualitative difference was noted among 12-year old boys. They generated a total of seven Indoors and Outdoors categories not mentioned by any other children in this study. No other categories generated by children were specific to only girls or boys.

Category (Indoors; Outdoors). Superordinate, basic and subordinate levels of abstraction were comprised of Indoors and

Outdoors categories. Some differences were noted. Significantly more subordinate level place categories were generated for Indoors than Outdoors. The degree of agreement on typical attributes and activities associated with place categories was greater for Outdoors places. The diversity of attributes associated with places was less for Outdoors places.

No significant differences between Indoors and Outdoors were noted for number of basic level categories generated by children and number of attributes and activities associated with these types of places although a greater number was consistently generated for outdoors categories. Indoors and Outdoors also did not differ in diversity of activities associated with them.

Levels of Abstraction. Degree of agreement on typical place category members was greater at the basic level than at the subordinate level. The subordinate level was not as well-defined. Additionally, subordinate level place categories were more diverse than basic level categories.

Fewer attributes and activities were generated for superordinate level place categories. The number generated for basic level and for subordinate level did not significantly differ from one another.

The degree of agreement on attributes and activities associated with place categories was lowest at the superordinate level. Additionally, attributes and activities associated with superordinate level places were more diverse.

Basic Level Categories. The most frequently generated basic level place categories were the same for all three age groups. These

categories were: House, school, store. "House" was generated most frequently in all groups. "School" and "store" were either second or third most frequent.

Subordinate Level Categories. "Big" and "small" places were the most frequently generated subordinate level place categories for house, park, playground and beach for all age groups. The eighteen subordinate level categories (three per basic level category) generated by children were: Big house, small house, building; catholic school, high school, nursery school; grocery store, candy store, toy store; big park, small park, amusement park; big playground, small playground, playground in a park; big beach, small beach, sandy beach. Two subordinates (i.e., amusement park, playground in a park) were selected from the subordinates of 12-year olds only because 5- and 8- year olds generated only two clearly identifiable subordinates for each basic level category (i.e., park, playground).

Types of Attributes. At the superordinate level, most attributes used by children to describe places, were other places and parts/people. At the basic level, most attributes were parts/people. At the subordinate level, most attributes were parts/people and parts/people qualified by adjectives.

CHAPTER IV

DISCUSSION

Taxonomy of Place in Children

A taxonomy of place categories was produced by children. It is important to keep in mind that this taxonomy was specific to the children in this study and is not meant to be seen as the taxonomy of places of all children: Rather, it is a taxonomy. However, this should not detract from the findings of this study. The children generated the particular category members and associated characterizations themselves and were not forced to show any evidence of consensus or change within and between age groups. Therefore, any significant similarities and differences remain informative and noteworthy.

Similar to adults, the children's place categories were hierarchically structured at three levels of abstraction (Tversky & Hemenway, 1983). However, this taxonomy became better formed with age such that idiosyncratic responses decreased and children produced a greater number of similar responses to one another, particularly at the subordinate level. Additionally, fewer subordinate level responses appeared at the basic level. Although the hierarchy of place categories was not as well-formed in children as in adults, particularly at the youngest ages, it was always appropriately structured in a hierarchy with levels of decreasing specificity.

Difficulty in producing subordinate level place categories may be due to a combination of two factors. One factor might be the later development of the skills of subordinate level categorization in children (Nelson, 1978). While Nelson (1978) showed that children do produce subordinate level instances, she found that this knowledge was incompletely developed in 5-year olds and used unreliably by them in tasks. Another factor may be the limited vocabulary of children. The children in this study were not as able as the adults of the Tversky and Hemenway (1983) study to produce subordinate level terms. This is consistent with research (Berlin et al., 1973) showing that subordinate and superordinate level terms enter the lexicon later than basic level terms. However, children in this dissertation research did appear to have some subordinate level place categories which they distinguished with the terms of "big" and "small". When asked to characterize these subordinates, most children at all ages gave information specific to these places which differentiated them from one another. This limitation in knowledge of and naming of subordinates may be the reason why there was a greater consensus in the use of subordinate level categories in the children of this study than in the adults of Tversky and Hemenway's (1983) study. The broad subordinate level of adults in that study resulted in too many subordinate level categories to produce consensus.

Consistent with research showing the early development of a basic level of categorization (Rosch et al., 1976), children in this research gave evidence of a basic level of places. The major operational definition of the basic level is a substantial gain in

informativeness at that level with only a minor gain in informativeness at a more specific level of abstraction. With adults, members of a basic level have many more attributes and activities associated with them than do superordinate level categories while the increase from the basic to the subordinate level is relatively slight. In the current research, children associated significantly more attributes and activities with the basic level than with the superordinate level categories. However, due to the less well-formed nature of the subordinate level in children, attribute and activities were even slightly greater at the basic level than the subordinate level for children of all ages.

The particular place categories produced by children overlapped to some extent with the adult categories produced in the Tversky and Hemenway (1983) study. As shown in Figure 1 and Figure 2, both adults and children frequently produced "school" and "store" for Indoors basic level. Children produced "house" most frequently and never used the term "home" as in the study of adults. "Restaurant" was a popular Indoors category among adults but not among children. Some children gave proper names for restaurants (e.g., McDonald's) at the basic level, but even this occurred infrequently. Children, but not adults, frequently used "playground" as a category, an understandable difference given the context of children's lives. Adults frequently gave "city" and "mountains" as basic level instances; categories which are understandably more basic to the wider ranging geographic worlds of adults. Both children and adults frequently used the terms "park" and "beach", places which are

in New York City.

As expected, children and adults produced very few similar subordinate level responses. In Figure 2 showing the most frequent subordinate level categories, the only ones common to both children and adults were "high school" and "grocery store". Children produced only two additional subordinates that were the same as the sixteen subordinates used in the adult study (department store; elementary school). Further research would be required to determine how many more of these adult subordinates would be recognized by children.

In summary, children did provide evidence for a taxonomy of places with a basic level of categorization. This hierarchy was similar in structure, but not content to an adult taxonomy.

Basic Level Place Categories

Number of Categories. Older children produced a greater number of categories. This was consistent across genders. While evidence for a basic level for objects has been shown to develop as early as 3 years of age (Rosch et al., 1976), the breadth of categories continues to develop (Nelson, 1974). This pattern was followed by children in this study. Additionally, not only breadth of categories grew, but "appropriateness" as well. Thus, fewer idiosyncratic and subordinate level responses were generated at the basic level by older children.

Degree of Agreement in Basic Level Place Categories. Contrary to expectations, the categories of 5-year olds were as well-defined as the categories of 12-year olds. Although the basic level is formed

at an early age for objects, it was expected that the larger scale and more complex nature of places would result in greater agreement among older children on typical members of categories. However, 5-year olds, 8-year olds and 12-year olds agreed among themselves to the same extent. This is consistent with Nelson's (1974) findings that 5-year olds and 8-year olds agree to the same extent on a variety of categories.

The expectation that place categories would be less diverse for older children at the basic level was particularly borne out by the results of this study. The categories of 12-year olds were less diverse than the categories of 5- and 8-year olds. However, 5-year olds and 8-year olds did not significantly differ from one another. In contrast, Nelson (1974) found significantly less diversity among 8-year olds across nine categories. However, examination of individual categories in her study shows no difference in diversity for the category of colors which is less concrete than the object categories. It is possible that places are also less tangible than objects and that this is why there is a similar pattern of development between 5 and 8 years of age. Perhaps because places are less tangible than objects, children at 5 and 8 years of age consider a greater number of different instances appropriate and are less able to discriminate more typical members. It is impossible to say at this stage how much the reduced diversity of categories among 12-year olds is a reflection of the developing intellectual abilities of children or their growing range of geographic experience.

Gender differences. There were no significant gender differences at the basic level in number of category members, agreement on typical category members and diversity of members. Additionally, inspection of all the basic level place categories generated by children did not uncover any instances restricted to only girls or boys at 5 and 8 years of age. At 12 years of age, however, boys produced several Indoors and several Outdoors categories not mentioned by any girls. One possible explanation for this is that at 5 years and 8 years of age boys and girls have similar freedoms and restrictions imposed on them by caretakers. At 12 years of age, boys may be allowed to go to and partake in activities that girls are restricted from. A qualitative review of interviews revealed that according to some 12-year old girls their mothers do not let them go to certain parks or go too far from home for safety reasons. Another possible explanation is that up until at least 8-years of age boys and girls have more similar interests, and therefore, more similar experiences. At 12 years of age noticeable differences in interests are present, and boys go to places that girls are not interested in. This explanation is consistent with Hart's (1978) findings that the development of children's ability to represent the spatial relations of places in the large-scale environment is very closely related to their freedom to explore the environment. Hart noted differences between girls and boys from an earlier age but they became particularly pronounced after 10 years of age when boys are commonly allowed to travel to places without restrictions. His study did not, however, look systematically at categorical place development.

Additionally, there are good reasons to believe that children in an urban environment--such as the children who participated in this study--are more restricted and protected by their parents than children in other locations, and that the disparity between the freedom of girls and boys has become greater in recent years (Hart, 1987).

Most Frequently Generated Basic Level Place Categories. Contrary to expectations, children in the three age groups generated the same most frequent Indoors and Outdoors categories. In particular, it was expected that the single most frequent category for each age group would be different because of age-related differences in experience and interests. Rosch et al. (1976) suggested that basic level objects for an individual result from an interaction between structure provided by the world and the state of knowledge and experience of the person doing the categorizing. Therefore different environmental structures as well as different amounts of knowledge can change classification schemes. That "house" and "park" were the most frequently generated Indoors and Outdoors place categories for all age groups does not mean that Rosch's views do not apply here. It may be that the same places remain significant throughout childhood. The way these places are perceived and used may change, but not their primacy.

Subordinate Level Place Categories

Similar to basic level place categories, the number of subordinate level category members generated were greater in older

children. Additionally, children generated significantly fewer subordinate level than basic level place categories. This was expected since past research indicated that the subordinate level was in the process of development (Nelson, 1974; Nelson, 1978). Unexpectedly, the difference between the number of basic level categories and the number of subordinate level categories was not greater for 5-year olds than for older children. It was expected that 5-year olds would find it relatively easier to generate categories at the basic level because of a very limited development of categorization at the subordinate level. However, the difference between the two levels of categorization was consistent across age groups suggesting that the subordinate level is in the process of development for all age groups.

Different from results at the basic level, the degree of agreement on typical category members at the subordinate level increased with age. This is a reflection of the lower production and greater idiosyncracy of subordinates at the younger ages. Given past research on object integration, and the relatively inaccessible and less tangible nature of place categorization, it was expected that 5-year olds would show almost no agreement at this level. While agreement was not high, it was higher than expected. This was probably due to the unexpected use of "big" and "small" subordinate level members.

Attributes and Activities

Number of Attributes and Activities. The number of attributes

and activities generated for superordinate level place categories was lower than the number generated for basic level and subordinate level categories. This is consistent with Rosch's (1978) description of the differences between levels of abstraction. Superordinate level categories are perceived to have very few common attributes and activities associated with them. Basic level category members have many attributes and activities in common, and subordinate level members share a few more than basic level members. However in the current study, subordinate level categories did not consistently share slightly more attributes and activities than basic level categories. In fact, basic level categories frequently shared slightly more. This is perhaps a reflection of the less well-developed formation of the subordinate level.

The number of attributes and activities generated at each level of abstraction increased with age. This followed the same pattern as the increase in category members generated.

Degree of Agreement. Agreement on the attributes associated with place categories at all levels of abstraction increased with age. With activities, however, only 12-year olds had a greater degree of agreement: The categories of 8-year olds were not more well-defined than were the categories of the 5-year olds. One possible reason for this is that 5-year olds agreed amongst their peers to a greater extent on the place activities than on the place attributes. As a result, their degree of agreement on activities was closer to that of 8-year old children. This supports the idea that function is more central to the concepts and categories of young children than are

perceptual attributes (Nelson, 1973; Nelson, 1978; Hart, 1978). Therefore, one would expect young children's categories to be more well-defined by activities. Perhaps by 8 years of age activities remain central but attributes also gain importance. This may be the reason why 8-year olds were found to agree to a significantly greater extent than 5-year olds on attributes associated with places.

Gender Differences. It was expected that girls and boys would differ on the attributes, and particularly on activities, associated with places due to a difference in their daily activities. This was not the case, however. They agreed to the same extent on typical (most frequently generated) attributes and activities. This suggests either that girls and boys do not differ to a large extent on the activities engaged in with regard to the place categories presented to them, or that the attributes and activities they produced were less personal and based more on general expectations.

Differences Between Indoor and Outdoors Categories

Relative to mean number of categories generated, more Indoors than Outdoors categories were produced by all age groups for all levels of abstraction. However, the degree of agreement on typical attributes and activities associated with place categories was greater for Outdoors categories. Thus Outdoors places were more well-defined than Indoors places relative to attributes and activities. One possible explanation for these findings may be that there is more commonality to outdoors experiences among children. Outdoors attributes and activities are shared by children whereas

indoors attributes and activities are more individualized. Another possible explanation for these findings is that outdoors activities relative to the recreational settings of park, playground and beach may be more open to freedom of use and hence more personally defined than the more rule defined indoor settings. If activities and their associated attributes are more personal to children, particularly Outdoors activities, then it follows, as the findings show, that there might be a smaller but more cohesive set of them generated by children.

The importance and primacy of activities to children is consistent with Nelson's (1978) work on the functional core of concepts and categories of children aged 3 to 5 years. Definitions of words tended to be in terms of what they do and how they are used. It follows, therefore, that what one does in a particular place best defines that place for a child. This was suggested by Hart (1976) in his study of children's place experience in a New England town.

Big and Small Subordinates

The use of the terms big and small to define subordinate level categories was an unexpected finding in this research. These two terms were subordinates of four out of six basic level categories in this study, resulting in very particular places for children when used in combination with the basic level terms (e.g., "big house" versus "big park".) In a study of the attributes of adjectives used by young children, Nelson (1976) found that size was frequently used to subdivide a larger class (e.g., a little dog; a big stick). Size

adjectives often specified sub-categories. The classificatory use of size appeared to be a way of naming new concepts and categories through word compounding. Nelson suggested that size terms were used temporarily by children as "primitive forms" of classification and would be increasingly replaced by more "permanent types" as these acquired names.

Dixon (1982) found that some languages such as Igbo and Hausa have only eight or twelve adjectives. "Big" and "small" are always central adjectives in these languages, and thus, are rich in meaning. If language for subordinate level categories is late in developing (Berlin et al., 1973), then usage of "rich" adjectives would seem appropriate.

Rapoport (1976) reported that dual classifications are used fairly frequently by adults and that they affect environmental taxonomies (e.g., city - wilderness; public - private). The use of big - small suggests that children also incorporate dual classifications in describing and organizing the environment.

Primary and Secondary Input in Category Development

This research found that the categories of young children are more idiosyncratic than the categories of older children and, at times, are particular to the child generating them. It may be that younger children are more idiosyncratic experientially and cognitively. They appear to consider "their experience" to be "the category" (e.g., "inside a hole" is a kind of indoors place). As children gain in primary experiences, their experiences are bound

to overlap more with those of others and they may begin to discover other members of "their categories" which are less idiosyncratic

Some categories are taught to children secondarily in school and through other people, books, magazines and television. For these categories, children learn the commonly accepted category name and components (Bruner, 1957). As children become older, this secondary knowledge increases.

Implications of this Research

This research elicited a taxonomy of places from children 5, 8, and 12 years of age, and indicated that knowledge about places has a hierarchical organization with a basic level of categorization. Past research has found evidence of a basic level in children as young as 3 years of age and a developing superordinate and subordinate level knowledge. Findings in this research suggest that some changes in categorization skills develop between 5 and 12 years of age and some changes develop between 8 and 12 years of age for all levels of abstraction. However, there is some working knowledge at all levels. Most of the changes occurring between 8 and 12 years of age appear to be related to a developing subordinate level knowledge among older cheldren.

From 5 to 8 to 12 years of age, place categories increased in size and decreased in diversity and idiosyncracy. This suggests an increasing hierarchization and articulation for children. However, the reasons for these changes are as yet unexplored. They may be due to cognitive limitations of 5-year olds relative to older children,

or to the inability of younger children to recall as many categories from memory. They may also be the result of language limitations in naming or labelling categories.

It may be inappropriate to discount categories of young children because they are different from adults or tc treat them as somehow less important. Many studies have judged the "appropriateness" of children's categories relative to adult standards. However, if categories are affected by the culture and existing knowledge of subjects, then adult judgments of children's categories should only tell us that they are different and not that they are "wrong".

Children in this research generated many place categories which were different from adult categories in the Tversky and Hemenway (1983) study. This does not necessarily imply that children are unfamiliar with the adult categories. It does suggest, however, that their spontaneous generations of places are different. Idiosyncratic categories appeared to be "real" for the children producing them. Thus, it would seem that in order to talk to and teach children about places and objects in the world, it is important to understand "their places" and "their objects".

This research also enabled us to see which attributes and activities are correlated with which places for children and to understand more about how children perceive and think about the world. For example, playgrounds appeared to be particularly important to children relative to the size of swings and slides, the availability of bathrooms and the presence of adults.

Regardless of the particular attributes and activities associated

information about what one may find and experience and how one may behave and interact with objects and people in places. It would be interesting to understand more about the origin of children's associations.

It would also be interesting to explore the language of place categories, how it develops and how much children relate to adult language for place categories. This would have significant implications in designing materials and methodologies in teaching children of various ages. Particular labels and names of places should not only be judged in terms of "appropriateness" since these terms clearly seem to suffice for children. Perhaps they should also suffice for adults when in interaction with children.

The appended material in this dissertation provides rich information on the content and characterizations of children's place categories. Due to the methodological design of this research this information was beyond the scope of this project. However, this feedback from children should not be ignored. Beyond the organization of children's knowledge there is much to be learned about the content of this knowledge. Consideration needs to be given to what children say about places in order to understand what they perceive and expect from the world around them.

APPENDIX I
INDOOR CATEGORY MEMBERS

5-Year Olds	8-Year Olds	12-Year Olds
Gym	Museum	Museum
Museum	Movies	Movies
Classes	Restaurants	Restaurant
Movies	Work	Job/Work
Restaurants	Church	Church
Work	Hotels	Hotels
Kitchen	Circus	Circus
Basement	Car	Planetarium
Upstairs	Zoo	Club house*
Library	My aunt's house	Farmhouse
Church	Party	Boys Club*
A hole	My room	Hospital
A shell	Bathroom	Library
Food Town	McDonalds	Bank
Inside a balloon	House	Post Office
Inside a bag	School	Arcades*
Hospital	Store	Hallways
House		McDonalds
School		Closets
Store		House
		School
		Store

*Boys only

OUTDOOR CATEGORY MEMBERS

5-Year Olds	8-Year Olds	12-Year Olds
Zoo	Zoo	Fish market
Outside playing	Rye Playland	Town
Sesame Place	Disneyland	Pools
Great Adventure	Central Park	Disneyworld
Coney Island	Outside school	Atlantic City
Camp	Yards	Outside the house
The city	Front of building	Benches
Brooklyn Heights	Backyards	Sesame Place
Across the street	Carnivals	Hershey Park
Park	The country	Action Park
Playground	The city	Great Adventure
Beach	North Carolina	The fair
	Around the world	Amusement Parks
	Pools	Camp
	Ice skating rinks	Backyard
	Roller skating rinks	Carnivals
	NYC	The street
	Park	Basketball court*
	Playground	Skateboard track*
	Beach	Stadiums*
		Camping alley
		Field
		Park
		Playground
		Beach

APPENDIX II
INDOOR BASIC LEVEL CATEGORY MEMBERS (SUBORDINATES)

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
House	Buildings Projects Little houses Big houses	Medium houses Buildings Twin Towers Empire State Mansions Castles Apartment building Little houses Big houses	Buildings Mansions Apartment buildings Co-ops Penthouse Hotels Motels Houses in Queens One-floor house Two floor house Dog house Little houses Big houses

INDOOR BASIC LEVEL MEMBERS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
School	Block School P.S. 7 School for grown-ups My cousin's school Catholic School	Block School Summer School Seventh Grade School College Little School Real School Nursery School High School Catholic School	Jr. Highl Special Education School Spots School Public School Private School Elementary School College University Computer Tech Art School Music school Graduate School Law School Beauty School Doctor School High School Catholic School

INDOOR BASIC LEVEL MEMBERS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
Store	Clothes Store	Supermarket	Supermarket
	Food Store	Chinese Store	Pizza Store
	Army Navy	Pizza Store	Appliance JStore
	Stores with everything	Big ones	Furniture Store
		Small ones	Shoe Store
	Candy Store	Bike Shop	Stationary Store
	Toy Store	Appliance Store	Hardware Store
		Furniture Store	Drug Store
		Superior	Department store
		Grocery Store	Bike Shops
		Candy Store	Newsstand
		Toy Store	Fashion Store
			Foodtown
			Jewelry Store
			Chinese Store
			Meat Market
			Sports Store
			Video Store
			Cleaners
			Alexanders
			Macy's
			Bloomingdales
			Grocery Store
			Candy Store
			Toy Store

OUTDOOR BASIC LEVEL CATEGORY MEMBERS (SUBORDINATES)

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
Park	Central Park Action Park Parks you camp in Big parks Small parks	Parks where you can ride your bike Parks with gardens Parks where they have races Parks with gardens Central Park Morningside Park Park next to my house Noisy parks Fun parks Lincoln Park Big parks Small parks	Central Park Cement parks Small parks in projects Jefferson Park Parks my mother won't let me go to Parks only with grass Parks with playgrounds Parks with benches 145th St. Park Parks with a little bit of grass in the middle of the street Big parks Small parks Amusement parks

OUTDOOR BASIC LEVEL MEMBERS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
Playground	In a park with trees With swings and slides Big playgrounds Little playgrounds	Sand playgrounds Where you can pretend With sliding boards and swings With sprinklers Without swings In a park With trees Big playgrounds Little playgrounds Playground in a park	At the Jr. High Elementary School playground Yards next to schools With a bathroom With mats on the floor Public Private With benches In a park With swings, see-saws and slide Regular playgrounds Backyards with swings Dirty Clean Big playground Little playground Playground in a park

OUTDOOR BASIC LEVEL MEMBERS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
Beach	Orchard Beach With a lot of sand No sand or water	Orchard Beach Miami Beach With a lot of sand Without sand Real ones Big beaches Small beaches Sandy beaches	Orchard Beach Public beach Private beach Coney Island With big waves With a lot of sand Beaches with pollution With crabs and jelly fish Shallow beaches Salty beaches Clean beaches Dirty beaches Rockaway Beaches with less people Rocky beaches Jones Beach Big beaches Small beaches Sandy beaches

APPENDIX III
ATTRIBUTES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUPERORDINATE	Offices	Kitchen	Air-conditioning
	Kitchen	Bedroom	Rugs
Indoors	Lunchroom	Bathroom	Tiles
	Bedroom	Dining room	Stove
	Living room	Living room	Refridgerator
	My room	My room	Television
	Roof		Rooms
	Floor	Walls	Living room
	Bird cage	Stove	Kitchen
	Crib	Dishes	Dining room
	Laundry	Books	Bedroom
	People sleeping	Television	Den
	Eating	Table	Bathroom
		Working	Warmer
		Eating	Lights
			Couch
			Chairs
			Tables
			Movies
			Quiet
Outdoors	Fence	Cars	Cars
	Cars	Sky	Trucks
	Clouds	Clouds	Buses
	Sky	Boats	Trains
	Doors	Trucks	Boats
	Sidewalk	Swings	Water
	Flowers	Slides	Backyard
	Dirt	Trees	Houses
	Rocks	Stores	Stores
	Swings	People	Schools
	Rabbits	Baseball field	Hydrants
	Doggie	Parks	Fire engines
	Cats	Kids	Schoolyard
	Giraffe	Kids playing in the street	Street dancing
	Elephant	Cars driving	Fire escapes
	Lion	Buses	Alleys
			Roof antennas
			Satellite dishes

ATTRIBUTES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
BASIC	Windows	All kinds of things	Name of the building
	Sofa	Bed	
House	Rooms	Pillow	Terrace
	Kitchen	Clothes	Windows
	Bedrooms	A picture	Doors
	Cement	Tissue box	Apartments
	A rug	Telephone	Living room
	Chairs	A rocker	Dining room
	People sitting on a couch	A dresser	Bedroom
		Terrace	Bathroom
	Telephone	Windows	People living there
	Refridgerator	Door	You can sleep there
	Oven	Apartments	
	Dog	Name of building	It's big
	People	Roof	Bigger than a store
	Name on the door	Floor	Plumbing
	People laying down and resting	Stairs	Heat
		My room	Oven
		Living room	Refridgerator
		Dishes	Sink
			Bathtub
			Television
			Telephone
School	Teachers	Teachers	Teachers
	Kids	Classrooms	Classrooms
	Fingerpaints	Blackboard	Room numbers
	Science work	Books	Gym
	Blocks	Kids	Playground
	Classes	Closets	Name of the school
	Steps	Bulletin Boards	Doors
	Black boards	Desks	Come inside a building
	A lot of stuff	Cafeteria	
	A building	Gym	A lot of kids
	The gym	Offices	A sign saying school
	Playground	Lunchroom	Desks
	Classroom	Auditorium	Schoolyard
	Telephone	Schoolyard	Blackboard
	Work	Assembly	Cafeteria
	My mommy would know	Cake sale	Library
	Things to draw	Tests	Kids taking lessons
	Computers	Homework	

ATTRIBUTES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
BASIC continued	See signs	Lots of things on the shelves	They sell a lot of stuff
Store	See letters that tell you what they have	Cards	Grocery outside
	Food all around	Make-up	They sell food and everything
	Lots of things to eat	Clothes	People buy a lot of things
	Lots of people shopping	Food	A sign tells you
	There's food to buy	Signs	Air-conditioning
	They have things that you play with	You buy things	Clerks
	You buy stuff	You pay for things	Sales people
		You stand in line	Sales
		A lot of people	Aisles
		Groceries outside	
		Fruits and vegetables	
Park	Things to play on	Slides	Swings
	Swings	Swings	Sliding boards
	Slides	Teeter-totter	See-saws
	Grass	Jungle Gym	Trees
	Trees	Sliding boards	Benches
	Chairs	Grass	Big swings for adults
	Candy	Trees	Monkey bars
	Rides	Birds	Showers
	People	Flowers	Sprinklers
	Ducks	Quiet	A pump nearby
	Water	People have picnics	See kids playing
	Gates	You can relax	Basketball games
	Openings you can see through	Lay down and read	Bike races
	Monkey bars	Take a walk	A sign with a leaf on it
	Merry go-round	Smells good	Grass
		See animals	A lot to do there
			Mats on the floor

ATTRIBUTES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
BASIC continued	Monkey bars	Sliding boards	Sliding boards
	Slides	Swings	Monkey bars
Playground	Climbing stuff	Barrels	Teeter-totters
	Teeter-totters	Monkey bars	Sand box
	Sand boxes	See-saws	Swings
	Swings	Houses	Benches
	Toys	Gravel	Stones
	Lots of things to do	Sand	A platform where you can walk
	Would see things	Sprinklers	Basketball courts
	Bathrooms	A lot of kids	Trees
	Turning things	Turning things	Lots of things to do
	Parents on benches	Kids playing	Young kids with parents
		Kids yelling	Cement floors
			Black rubber mats so you won't get hurt
Beach	Sand	Sand	Sand
	Water	Water	Saltwater
	Boats	Fish	Seabirds
	Sea horses	Sea gulls	Towels
	Palm trees	Big umbrellas	People lying on towels
	People	Lifeguards	Water
	Towels	Sharks	Rocks
	Waves	Boats	People
	Waves on the ocean	People getting a tan	Lifeguard
	Shells	Jellyfish	A store
		Garbage cans	People selling drinks
		Boardwalk	Boats out in the water
			Jellyfish
			People getting a tan
			Hot sun
			People swimming
			People playing volleyball

ATTRIBUTES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATE	Lots of rooms	A lot of rooms	Pretty
	Backyard	Big inside	More room to do things in
Big House	Stairs	More than one floor	Lots of rooms
	People doing things in different rooms	Not little	Stairs
	Lots of bedrooms	Has a backyard	A whole floor to yourself
		A lot going on	Your own backyard
		A big dining room	Nice
			Quiet
Small House	Not too big	Small inside	Not a lot of rooms
	Not a lot of rooms	No elevators	On the floor, not high
	Little rooms	No stairs	Sand outside
	Not too many people	Not a lot of rooms	No stairs
		Filled up inside	Little rooms
			Can be crowded
Building	Warren and Shirley live in one	Lots of floors	Lots of floors
	I can see when my mommy calls me so I know it's my building	Elevators	Have someone under you
		Stairs	More than one person on a floor
	High in the air	High up	High up in the air
	Elevators	A lot of people there	Lots of windows
	Lots of kids playing	Lots of doors on a floor	Elevators
	Lots of people live there		Stairways
			Firehoses on each floor
			Lots of people in windows

ATTRIBUTES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATE continued	Little kids	Little children	Young children
	Drawing	Lots of noise	Play areas
	Playing	Playing	Toys
Nursery School	Play rooms	Playrooms	Books
		Lots of toys	Games
		Story books	Sing along
		Nap time	Teachers
			Noisy
			Small chairs and tables
High School	Older kids	Older people	Teenagers
	Big kids	Classes	Different teachers for each class
	A lot of kids	Lots of books	Laboratories
	Big school	Teachers	Lots of work
	Lots of teachers	Blackboards	Kids learn languages
	Classrooms	Bigger schools	School teams
	Kids hang outside	More far away	Cheerleaders
	My brother goes there	Football field	School is bigger
		Big boys playing in the field	More tests there
Catholic School	Girls look the same	Teachers	It's religious
	Teachers	Classrooms	Kids wear uniforms
	Classrooms	Kids wear uniforms	They're stricter
	Kids take the bus to school	Nuns teach there	The teachers are nuns
	Kids wear the same clothes	They hit you	Classrooms
		Girls have to wear skirts	They teach Latin

ATTRIBUTES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATE continued	Lots of toys	A lot of toys	Filled with toys and
	games	A lot of kids	games
	It's fun	Rows of toys and	Toys for all ages
Toy Store	Kids go with parents	games	Lots of kids
		People buy things	Computer games
	My mommy takes me there	I buy presents there for birthday	Mostly younger kids
	You go for your birthday	parties	Crowded at Christmas
		Dolls	
	People buy toys	Stuffed animals	Windows full of toys
	Lots of colors	Transformers	
Candy Store	Lots of candy	You can buy candy there	They sell candy and gum
	Gum	Newspapers	Magazines and newspapers
	Jars with candy	Gum	
	A counter with good food	Cigarettes	Cigarettes
		Lots of people in there	People go in and out
	People eat there		It's crowded
	I buy M&Ms there	Lot of candy to pick from	Lottery tickets
	My daddy buys newspapers there		Some people hang around there
		Stools where people sit	
	Chinese people work there	A window outside with newspapers	You can buy candy and soda
			Some have an outside window
		They have ice cream	
Grocery Store	Buy food there	Buy food there	Buy food there
	Lots of things	Pass the girl in the front	Fruits and vegetables
	Mommys go there		
	Buy baby food there for my sister	They sell fruit	Meat
		Cherries, grapes, and apples	Chicken
			You wait in line to pay
	People buy food and fruit there	They weigh things	All kinds of food and drinks
	You wait in a line with your food	You push a cart with your stuff	Cleaning products
		Souvenirs	Napkins

ATTRIBUTES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATE continued	Grass	Benches	Benches
	Tree	Sandbox	Mats
	Lots of swings	See-saws	Grass
Big Park	Benches	Chains	Trees
	A zoo	Pool	Lots to play on
	Lots of dogs	Ice-skating	A lot of showers
	Lots of people	Big hills	Sprinklers
	Bikes	Fun	Big lake
	Slides	Lots to do	Swimming pools
	Teeter-totters	Swings	Places to ride bikes
		Slides	Rent bikes
		Swings for big people	People walking dogs
		A merry go-round	People jogging
			Cars go through
			Lots of property
			Big rocks
			Big swings
			Clean
Small Park	Little swings	Not that many things to play on	No grass
	Not too much there	Not too many toys	Not a lot of trees
	Little children	Little swings	Not a lot of space
	A little grass	Little slides	Not a lot of swings
	Little slides	Small children	Little swings
		Benches	Bathroom for kids
		The ground	Plain
			Nothing in them

ATTRIBUTES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATE continued	Rides	Rides	Rides
	Roller coaster	Lots of people	Go on the rides
	Candy	You go with your family	They give candy out
Amusement Park	Lots of people	Big rides	Swimming pool
	Rides that go around	Haunted house	Grass
	You can eat there	It's in the summer	You can sit
	It's far away	It's like a carnival	Have a picnic
Big Playground	Stuff for big kids	Swings	A lot of space
	Swings	Slides	Benches
	Slides	Sand	Stones
	See-saws	Wheels	Swings
	Places to sit	Big barrels	See-saws
	Older people	Stuff for big people	Slides
	For the older kids	A lot of room	Dirty
		Places for taking buses, trains	Broken glass
			Bigger kids
			A lot of sand
Small Playground	Little swings	Little sliding board	More crowded
	Little slides	Monkey bars	Not as much space for stuff
	Mommys and children	Sandbox	No glass on the floor
	Lots of baby children	Benches	Cleaned and nice people
	Sandbox	Little children	Little children play there
		Children with parents	Bathrooms
		Big, long poles	

ATTRIBUTES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATE continued	Trees Swings Slides	Trees around it Swings Slides	A lot of trees Slides See-saws
Playground in a Park	Teeter-totters Bathroom	Monkey bars Slides Bathrooms Other stuff Older people walk outside	Swings Baseball Basketball Football
Big Beach	Lots of sand Lots of water A lot of people	Lots of water Lots of sand Lots of people A lot of room Big waves Lifeguards	A lot of sand Lifeguards A lot of people Places to swim Boats come in close
Small Beach	Not a lot of sand Not a lot of water Not too many people I don't like to go there	Not too much sand Not a lot of water Not too many people can fit Not as much fun	Hardly any water Little places to swim Not a lot of sand Less people
Sandy Beach	Too much sand A lot of sand You need mommy to walk	Thick sand Not for little kids You sink in You can't walk	A lot of sand Different colored sand Lifeguard You can set blankets down People lie around People have picnics

APPENDIX IV
ACTIVITIES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUPERORDINATE	Work	Cook	Visit people
	Go in the room	Sleep	Play
Indoors	Play	Play	Work
	Eat	Do homework	See a movie
	Sleep	Read	Play video games
	Cook	Eat	Eat
	Eat supper	Watch TV	Watch TV
	Put trash in cans		Sleep
Outdoors	Play	Climb a tree	Walk
	Jump	Play	Travel
	Run	Play soccer	Read
	Fix a car	Play in the park	Play
	Go on swings	Go yachting	Sit down and watch the scenery
		Drive	Drive
		Walk around	Go on a bus
		Ride a bike	Hang out with friends
			Have a picnic
			Fly a kite
			Ride a bike
			Walk a dog
BASIC	Sleep	Cars	Sleep
	Eat	Sleep	Cook
House	Fix dinner	Cook	Clean
	Work	Clean the dishes	Wash dishes
	Sit on a couch	Watch TV	Vacuum
	Feed a cat or dog	Feed the cat	Clean the kitchen sink
	Play	Make stuff	Play
	Cook	Vacuum	Sit around
	Lay down and rest	Clean	Read books
	Wash dishes	Play	Have friends over
	Clean my room	Draw	Makeup stories with friends
		Turn on the heat	
		Go to bed	

ACTIVITIES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
BASIC continued	Go to bed when my mommy tells me	Get dressed	Talk on the telephone
House continued	Have a snack	Eat	Read books
	Walk up and down stairs	Talk on the telephone	Listen to records
	Watch TV		
	Read a book		
	Take a shower		
School	Work	Work	Work
	Sit down	Write/take a test	Learn
	Read a story	Read	Play
	Read words	Do math	Free play
	Eat a snack	Spell	Help people
	Computer	Write	Put on plays
	Play	Sing	Read
	Play outside	Learn stuff	Learn history
	Sing	Go to gym	Do math
	Write		
	They teach us something		
Store	Buy stuff	Buy things	Shop
	Pay	Pays the cashier	Buy stuff
	Go home with stuff	Look around	Look around
	Get food they don't have	Pick stuff out	Spend money
	Eat food	Shop	Buy food
	Say "How much is this?"	Stand in line	Look for sales
	Shop	Buy groceries	Bargain
	The manager works		Pay the cashier

ACTIVITIES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
BASIC continued	Play	Play	Play
	Ride slides	Play games	Sit down
Park	Play free tag	Sit down	Talk
	Play hide-and-seek	Talk	Run Exercise
	Fall sometimes	Have picnics	Bike ride
	Go on the merry go-round	See animals	Walk on the grass
	People talk	Go down the slide	Cook-out
		Go on the teeter-totter	Have a picnic
			Play baseball
			Get wet in the sprinklers
Playground	Play	Play	Play
	Climb	Climb	Go on swings
	Slide down the slide	Run around	Go on the slide
	Play tag	Play tag	Gymnastics
	Play ball	Slide	Run around
	See things	Make teams	Hang out
	Parents sit on benches	Push each other	Listen to music
Beach	Play	Play	Play
	Swim	Swim	Play in the water
	Sail a boat	Sit in the sun	Play on the surf
	Play in the water	Watch boats	Lay on towels
	Find shells	Buy souvenirs	Get a tan
	Fish	Get a tan	Set blankets down
	Build sand castles	Walk in the sand	Swim
		Make sand castles	Water surfing
		Surfboarding	Have a picnic
		Get something to drink	Loaf
		Play with towels	Buy ice cream
			Go to sleep
			Make sand castles

ACTIVITIES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATES	Play a lot	Play in the backyard	Have big parties
Big House	Play in the backyard	Walk up and down stairs	Hang up a lot of paintings
	Have a lot of people over	Eat in the dining room	Clean
	Clean a lot	Have parties	Have barbeques
	Sleep alone	Play games	Eat in a dining room
		Clean up	Watch TV
		Have guests	Walk up stairs
Small House	Play	Watch TV	Feel crowded
	Not too much to do	Share a room with brothers/sisters	Yell at each other
	Play outside	Play	Play together
	Cook	Cook	Share stuff
	Clean	Clean	Watch TV
	Have fights	Play outside	Cook
			Clean
Building	Play in front	Ride in the elevator	Hang outside
	Visit each other	Play with friends	Ride in the elevator
	Yell out the window	Ring the bell downstairs	People fight
	Have fun	Cook	Have parties
	Go in the elevator	Clean	Watch TV
		Visit neighbors	Eat
		Sit in front	Visit each other
			Yell out the window to their kids

ACTIVITIES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATES continued	Play with blocks	Play	Play
	Draw	Draw	Draw
	Sing	Learn things for real school	Paint
Nursery School	Sleep	Teach children	Make things
	Fingerpaint	Eat snacks	Take naps
	Run around		Teach
			Read stories
			Listen to records
High School	Learn stuff	Go to classes	Go to class
	Read	Learn	Study
	Write	Study	Have laboratories
	Walk with their friends	Do homework	Take computer classes
	Play football and basketball	Play on teams	Learn a language
		Teach	Prepare for college
		Have clubs	Do homework
			Math
			English
Catholic School	Go to school	Learn	Go to class
	Learn	Pray	Study
	Play	Study	Take Latin
	Make noise	Take different classes	Same as regular school
		Hit kids	Take tests
			Homework
			Learn

ACTIVITIES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATES continued	Buy toys Play with the stuff Go with mommy	Buy toys Look around Pick out presents Buy Christmas presents Pick out what you want Pay for things	Buy toys Pay for toys Buy presents Walk around and look Try out some things
Toy Store			
Candy Store	Buy candy Pick out things Buy food Eat Pay the man	Buy candy Buy gum Buy soda Eat food Read newspapers Talk to other people Pay the man in the front	Buy candy Buy gum Buy newspapers and magazines Run in fast Hang around Eat
Grocery Store	Buy food Buy things to take home Wheel food around Get in line	Buy groceries Buy food Buy fruit Get milk Pay for food Get stuff to eat	Buy groceries Get things to eat Buy food for the family Pay for food Wait in line with your food Get things for your house Shop Wheel a cart

ACTIVITIES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATES continued	Play	Play	Ride bikes
	Run around	Jump	Run
	Go on the swings	Run up and down	Rent Bikes
Big Park	Ride your bike	Play baseball	Walk the dog
	Walk with mommy	Race	Sit around
	Go on the grass	Ride bikes	Skate
	Look at things	Have parties	Swim
		Have parades	Have a picnic
		Ice skate	Ride cars in it
			Play
			Double Dutch contests
Small Park	Play	Play tag	Take little kids there
	Play tag	Go on swings	Go on the little swings
	Not too much	Go on the sliding board	Not a lot of space
	Walk	Not that many things to do	Walk around with children
	Go on swings	Look around	Meet friends there
Amusement Park	Go on the rides	Go on the rides	Go on the rides
	Eat candy	Eat a lot	Eat
	Go on the merry-go-round	Go on the roller coaster	Have a picnic
	Yell on the rides	Get scared on the rides	Eat candy
			Swim
			People put on shows
			Have a lot of fun

ACTIVITIES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATES continued	Play	Ride bikes	Go on swings
	Big people go on swings, slides	Play tag	Go on slides
		Play	Go on see-saws
Big Playground	Run around	Go on the swings	Sit on benches
	Play tag	Go on slides	Climb
	Sit with mommy	Play in the sand	Meet friends
	Eat	Look at animals	Play around
Small Playground	Go on the swings	Go there with little kids	Little children play there
	Go on the slides	Go on swings	Go on the little swings
	Go in the sandbox	Go on monkey bars	Play in the sandbox
	Climb on things	Go in the sandbox	Go on the slides
	Mommy watches you		
Playground in a Park	Play	Play	Play baseball
	Go on swings	Go on the swings	Play basketball
	Play tag	Go on the slides	Play football
	Run around	Go on the see-saw	Go on swings
	Go on the teeter-totter	Look at trees	Go on slides
		Go for a walk	Go on see-saws
		Ride bikes	Meet friends
Big Beach	Go in the water	Swim	Swim
	Play in the sand	Watch the boats	Play volley ball
	Eat stuff	Get a tan	Lie down
	Play in the water	Play	Get a tan
	Look for shells	Spread out blankets	Watch boats come in
	Go fishing		Ride the waves
	Climb up trees	Play with a ball	Listen to music
	Sail a boat		Bring coolers and eat

ACTIVITIES GENERATED FOR CATEGORIES AT SUPERORDINATE, BASIC AND SUBORDINATE LEVELS

CATEGORY	5-Year Olds	8-Year Olds	12-Year Olds
SUBORDINATES continued	Go in the water Play Eat	Go in the water Can't do too much Get a tan	Go in the water Get a tan Cool off in the water
Small Beach			
Sandy Beach	Make a sand house Bury themselves Swim Play	Play with the sand Build sand castles Go in the water Get a tan Have picnic	Build sand castles People bury themselves Sculpt sand Play games on the sand Lie down on the sand Sleep Get a tan Swim Have a picnic Play in the water Buy ice cream

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