Physical Environment Socialization: Development of

Attitudinal and Aesthetic Response towards Built and Natural Environments

By

KATHLEEN ANN HOYT

B.S., Psychology, Washington State University 1979

M.S., Psychology, University of Georgia-Athens 1982

M.A., Psychology, University of California-Davis 1988

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Psychology

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA

DAVIS

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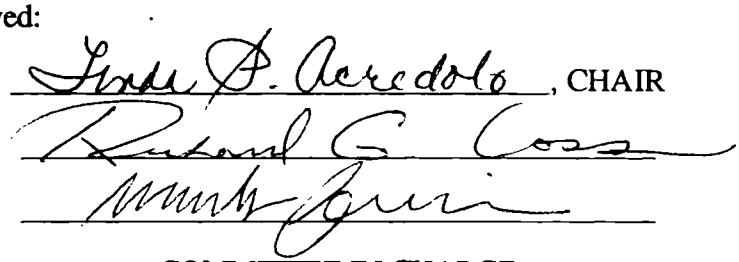

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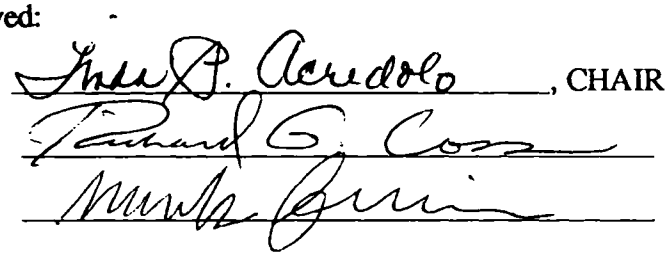

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Well, you've cracked the sky

scrapers fill the air

Will you keep on building higher

'till there's no more room up there?

...I know we've come a long way

We're changing day to day

But tell me, where do the children play?

Cat Stevens

## Acknowledgements

My current perspective feels like a wonderful patchwork quilt of all of those I have encountered during my time at UC Davis, each patch of the quilt is an encapsulation of each of the following people. I feel sincere appreciation toward Dr. Linda Acredolo, who gave up many hours for discussion and editing of this manuscript but also allowed me to try out my wings without limitations--the ingredients of a great major professor. I thank Dr. Richard Coss for his comments and particularly for his undying desire to discuss new and controversial ideas which have greatly influenced my research goals. The ideas of Dr. Mark Francis have also influenced this project through his helpful comments but more so through his positive outlook and enthusiasm for research on children and designed environments. I also appreciate the powerful advice of others around campus such as Dr. Alan Elms, Dr. Lawrence Harper, and Dr. Michael O'Mahoney. I would like to give a large amount of credit to my statistical advisors who got me through those regression analyses. John Price relieved much of the pain of the results section through mental acupuncture, I believe, while David Philhour and Barrett Caldwell assisted me during the initial stages.

The tears and joys of this project have been shared with my two best friends--Lori Lott and Alyson Burns. Alyson inspired this project through her strange love for Los Angeles and Lori continues to inspire me with her child-like enjoyment of the physical environment. I want to thank my grandmother, Grace Miller, for supporting me financially through the torrent of bills and for always having a wise and calming word to say at the right moment. And to Cody, my black labrador, I appreciate the fact that you are the only one who has managed to find a good use for my dissertation--as a comfortable sleeping pad.

Finally, thanks to my family who gave me my environmental values which lead me to this research and the strong appreciation for all of the trees who gave up their life for this document. I hope my research will give something in return.

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## Abstract

There is considerable empirical support for the conclusion that natural environments and features are preferred over human-built environments by all age groups. These preferences influence behavior, beliefs and values for natural and urban environments. If preference for natural environments is dominant, then why do so many people choose to live in urban settings or have a low value for protecting natural areas? Very little of the environmental literature is devoted to developmental factors that may influence adult environmental attitudes, particularly, the role of early familial and experiential factors in environmental attitude formation. The emphases of this exploratory study were upon the similarities within families for preference expression and upon the environmental experiences that lead to a particular environmental attitude in children.

Subjects included 32 families with an 11 year-old child, 15 urban families and 17 rural families. The families were selected such that half of the sample had both parents from a rural childhood and half from an urban childhood residence. Environmental preferences were based on ratings of like/dislike for various scene types and a background questionnaire concerning environmental values, environmental familiarity, recreational patterns, and residence was completed for each subject. The results indicated that children's preference is influenced by their past and current environmental experience. For the adults, childhood experience was weakly related to preference and values, whereas, current environmental experience was strongly related. Natural and built preferences were found to be influenced by different developmental factors and each preference type had its own distinct relationship with other environmental attitude components, emotional and behavioral maturation, and parental influence. The results indicated that values and preferences are similar within family groups and the environmental experience of the parent can be transmitted to the child. The results suggest that there is inter-generational transmission of temperamental styles that influence the child's aesthetic appreciation of physical environments, and of environmental empathy and a sense of responsibility toward the protection of physical environments.

## Introduction

> "...the place makes the man. Far more important in this regard is the landscape in which the person is born and raised. It is extremely meaningful to know that someone is a westerner, a resident of New York City, a New Englander, a Texan or from Dubuque. We instinctively sense that people acquire certain mental and physical characteristics from a particular locality." Roderick Nash (1975, p. 11)

### Summary of Experimental Objectives

The environmental attitudes we hold can affect our preference for where we live, how we spend our leisure time, how we move through the environment and how we design our homes and workplaces. Such attitudes can affect our emotions, thoughts and behavior under certain environmental conditions, and these actions in turn affect our attitudes throughout life. Certain attitudes toward the urban environment may draw us to the city for weekend recreation, and the experiences there will in turn affect the continuing values and beliefs about the city environment. Given that attitudes are often based upon past experience, particularly family experiences, it is useful to ask what developmental factors play a role in individual variations in environmental attitude or preference.

One component of an environmental attitude is the individual's preference for natural features such as trees, water, undeveloped wilderness, as opposed to human-made features such as buildings or roads. There is considerable empirical support for the conclusion that natural features in environments are preferred by the majority of subjects over human-made alterations of the environment. Research suggests there is a strong bias towards natural features in subjects' affective judgments of photos of landscapes, and an equally strong dislike in the photos provided for human-made features such as buildings or roads. In landscape preference research, natural qualities have consistently been found to

have a positive impact upon ratings for scenic quality. Nature has also held an important role in the traditions of many cultures throughout history in a variety of ways. One reason for the similar importance of nature across many cultures may be that nature offers specific psychological benefits such as the opportunity to experience tranquility, competence in physical skill, or control over social contact. The value of these benefits may be similar across a wide range of people, but the psychological benefits from being in a type of environment can also have varying importance for different individuals and cultures. Therefore, experience plays a large role in the appreciation of psychological benefits of being in a particular type of environment.

Frequently in environmental preference studies, the emphasis is placed upon group similarities, while individual differences in preference and environmental experience are virtually ignored. The developmental background is also frequently ignored as an important variable, except in cases where demographic variables such as income, education, social class, and residence are considered. The specific developmental environmental experience of individuals has rarely been treated as an important consideration in preference studies, in fact psychological variables tend to be avoided by researchers in the field in general.

This study was designed to avoid three major problems present in much of past research on environmental attitudes. First, most studies of this sort focus on a single expression of attitude disregarding any continuity with other expressions of attitude. For example, studies of landscape attitudes typically measure preference only, disregarding the actual behavior of the individual in response to the specific landscape. It is important for the purposes of prediction to measure the three primary components of attitude (behavior, cognition, affect) in order to sufficiently account for variability of behavior. In the present study, three components of environmental attitude were measured, including the behavioral component (leisure time activity location and choice of residence), the cognitive component

(environmental values and beliefs, environmental preferences) and the affective component (environmental preferences).

Second, most environmental preference studies have taken a psychophysical approach, emphasizing the role of stimulus qualities in preference judgment. In this approach a particular environment can be labeled according to stimulus qualities such as texture, complexity, color variation, vegetation, etc. Researchers typically vary the level of one of these qualities within landscape photos provided to the subject, and observe which level of that quality is preferred. The primary advantage of this approach is that the researcher can manipulate the stimulus qualities and achieve reasonably high predictability of preference. However, as discussed in the Environmental Preference Measurement section, the stimulus qualities that are manipulated are often removed from the environmental context and the ecological validity of the prediction of preference is very low. There are many disadvantages to this approach, one being that it is too simplistic to explain the preferences of human beings. Many other factors are involved such as the mood of the subject at the time of testing, the photographic qualities of the photos presented, the amount of time the subject has spent in the environments being presented, or the emotions the subject may be experiencing when viewing the presented photos. The emphasis upon stimulus qualities disregards the important psychological factors that often affect evaluative judgments such as preference. As the model in Figure 1 suggests, there are many factors that play a role in environmental attitudes and studying any one of them in isolation, as do the psychophysicists, does not do justice to the complexity of human-environment relations.

Finally, most environmental preference studies have ignored developmental factors that influence individual differences in environmental attitude. In particular, researchers need to consider the amount of exposure to the landscape type in question, the amount or type of recreational experience in the particular landscape and salient beliefs or values of the subject towards specific landscapes. In this study more complete information about such

experiential variables has been obtained in order to ascertain their impact upon individual attitudes.

There is also a need to focus on age-related changes in preference. There is a dearth of empirical evidence regarding development of aesthetic response to the environment and environmental representation in children with regards to the function of features. Wohlwill (1976, 1987), who recognized the importance of the role of the physical environment in development, voiced these same concerns and called for an emphasis in future research on individual differences in response to the environment with an effort to incorporate the organismic approach. This dissertation represents both of these goals. The development of environmental attitudes is viewed as an active interaction between the environment and individual experience--the organismic approach. This is an active and dynamic approach that has been minimally emphasized in environmental attitude research, thus far.

This study involved a cross-sectional study concerned with age-related differences in environmental attitude, similarities in landscape preference within single family groups and the relevant factors that affect attitude formation. One focus was upon age-related differences in the expression of preference for environments, between childhood and adulthood. The second focus was on the development of preference in childhood. The goal was to determine the degree to which preference is related to the child's direct experiences in the environment through leisure time and to attitudes expressed indirectly by parents such as place of residence or choices made during family leisure time. The third focus was upon the relationship between adults' environmental attitudes and their own developmental experience with environments. Therefore, environmental preference was the main variable of interest with attention to age and individual differences during development.

## Definition of Preference

Cooksey, Dickinson, and Loomis (1982) define environmental preference as the evaluative and cognitive assessments of environmental psychological attributes. Therefore, preference has two components, affect and cognition, that are tools we use to assess the physical features of the environment. The cognitive complements to emotions vary with age and experience such that affective-cognitive structures are changed in form throughout the life span.

There are contrasting perspectives on preference that emphasize the affect-cognitive components differently. Kaplan (1982) states that one view of preference is that it is an indicator of aesthetic judgment. Aesthetic judgment is often a like-dislike affect (Zajonc, 1980) that is associated with pleasurable feelings and neurophysiological activity (Berlyne, 1971). Often this view focuses on the relationship between stimulus properties and affect, and does not place value on the role of cognition. A second view involves decision making and choice, that preference is an indication of the choice for the highest valued alternative. This view does incorporate cognitive processing, as suggested by Cooksey et al. (1982). The stimulus properties of an environment can lead to an interest in that environment that will direct locomotion and lead to a gathering of new information about that environment. Obtaining pleasure from those stimulus qualities can lead to a better learning situation and better memory for the experience. Therefore, the cognitive and affective components of preference can interact to produce a response toward a specific environmental feature or toward an environment in general. Again, these two components originate in experience, knowledge, expectation, and the sociocultural context interacting with environmental features (Pitt and Zube, 1987). In the present study, this latter approach is adopted. Specifically, preference is considered to be an interaction between cognitive and affective components of evaluation leading to decision making and choice between alternatives.

In many of the studies of environmental preference, researchers are actually measuring the degree of liking instead of measuring choice between alternatives. Often the

subject is requested to indicate how much they like a scene by rating the scene on a 5 or 7-point hedonic scale. This is a measure of the degree of liking for a scene, not preference per se. To measure preference, the subject would need to be provided with alternatives such as two photos of similar landscapes and then asked to indicate which environment they "prefer". Therefore in many previous studies the final conclusions regarding preference are actually conclusions regarding degree of liking. While these two concepts are obviously distinct, they are also linked together. A high degree of liking for something does indicate that there is a high probability that the same object will be preferred in a choice situation. Therefore, preference is indicated by degree of liking measures, but the two measures are not perfectly congruent concepts. In the current study, it was necessary to measure the degree of liking for scenes due to the limitations of testing children. Many young children have difficulty choosing between alternatives that are presented simultaneously, and it is not always clear that expressed choices by children are valid measures. Therefore, a rating scale was used for all subject groups and preference will be assumed when degree of liking for one landscape was numerically higher than degree of liking for another. Throughout this study the traditional term of preference will continue to be used, with the knowledge that the degree of liking is only one component of preference. This is the same tactic of Kaplan and Kaplan (1983) who stated that "although preference is a guide to choice, the assessment involved in preference is assumed to take place whether one actually has a choice or not." (page 80). The emphasis upon degree of liking is not in opposition to the perspective discussed in the previous paragraph. It is assumed that preference, whether a choice is offered or not, is based upon cognitive and affective responses working in tandem and influenced by developmental experience.

### The Definition of Natural and Built Environments

One of the difficulties in the field of environmental preference is formulating a reasonable and useful operational definition for the terms natural and human-built. Altman

and Chemers (1980) suggest that natural environments are made up of geographical features, conditions, flora and fauna. Built features are the result of human alterations. Driver and Greene (1977) suggest that the quality of "natural" is the relative degree of man's influence. In the latter definition there is the implication that environments vary along a continuum extending from those that manifest only natural features (undeveloped wilderness) to those that consist entirely of built features (an urban ghetto), graded according to the degree of human influence. Altman and Chemer's definition implies that there is a dichotomous situation, where something is either natural or it is built.

Currently, it is not clear how the majority of subjects will view these two concepts, on a continuum or dichotomous basis. Wohlwill (1983) suggested that both conceptualizations have a similar problem. First, he pointed to the fact that not all individuals or cultures view man-made features as unnatural. Some architects view the construction of buildings as similar to the bird building a nest, a very "natural" process to undertake. Therefore, neither conceptualization can be considered universal. However, Wohlwill failed to point out that the lack of universality does not mean that either of the conceptualizations is not useful for most individuals or cultures.

Wohlwill also questioned where an object such as an artificial lake would fit on such a continuum? It is human-made and yet "appears" natural. In fact, he asks, is there any existent "natural" nature that remains untouched by humans left on this planet? Although there is merit to Wohlwill's argument, it does not seem useful to be concerned with this issue of "apparent" vs. "real" naturalness with regards to the study of preference, when in most of these studies we are concerned with the "apparent" naturalness or the "apparent" amount of human influence in the landscape. In other words, it is reasonable to expect that the response to Lake Powell, which is human-built, will not be any different from the response to Salt Lake, assuming the respondent is not aware of the origin of the two lakes. It is highly probable that the psychological benefits and the attitudes of most subjects toward the two lakes would be very similar despite the true "artificiality" of Lake

Powell. Of course, most people are sensitive to any apparent human influence when it is more obvious. Therefore, the plastic flower may not supply any psychological benefit to us due to its obvious artificiality, assuming we have learned to devalue artificial qualities.

Wohlwill points out that one way to deal with the definitional problem is to find the stimulus qualities that are equated with nature and those that are equated with built environments and utilize those qualities to define the terms. For instance, nature can be defined by its typical perceptual features that are different from those of human built settings such as irregular lines, curvilinear edges, continuous gradations of shape, color and rough textures. But as Wohlwill points out, stimulus qualities have not been proven to have a direct relation to human response to the environment and so are not very useful either.

Wohlwill concludes that the conception of nature is formed by each individual depending upon the type of experience in environments and their choices of which features merit attention, factors which are both influenced by personality and differences in familiarity with the environment. The problem with this conclusion is that it cannot explain why there is high inter-subject agreement upon what is natural and what is human influenced (Herzog, Kaplan, and Kaplan, 1982; Palmer and Zube, 1976). Somehow, many subjects use the continuum between natural and built in a similar manner. In the current study, it is assumed that natural and human-built features lie upon a continuum as described by Driver and Greene (1977). Palmer and Zube (1976) found evidence to support the existence of such a continuum. When subjects in their study made judgments about landscapes, the judgments "naturally" conformed to a continuum, ranging from purely natural landscapes to human-made. Herzog, Kaplan and Kaplan (1982) found the same continuum is used "naturally" by subjects when judging built settings, preferences ranging from those settings with some natural features to those with no apparent natural features. In the current study the continuum is assumed, but it is now combined with the

assumption that where a particular individual would label and place a specific scene or object on the continuum will vary according to individual experience and atttitude.

Understanding the meanings the terms "natural" and "built" have for different individuals, necessitates attention to possible developmental differences. At this point, it is not clear whether there are age group differences in the use of these two terms. Holcomb (1977) found that 4 year-old children do not make the distinction between nature and human-built and concluded that it is a learned distinction enforced by education and adults. However Holcomb's study was exploratory and had methodological limitations such as a small sample size and the fact that the sampled environments were limited to favorite places of each subject. When obtaining evaluative judgments regarding preference, or in this case regarding conceptions of environments, it is important to sample several different types of landscapes (Kaplan, 1975). The conceptual representations of favorite places may differ significantly from representations of other types of places. Therefore, further evidence is needed to support Holcomb's conclusions.

In contrast to Holcomb, Wohlwill (1983) found that 6 year-olds do use the concepts of "natural" and "built" to sort environmental scenes. However, he described this study as a preliminary one and suggested that more empirical support is needed. Also, these two researchers may have overlooked two points. First, children may share a distinction between the concepts of natural and human-built with adults, but due to cognitive developmental differences, the definitions of the terms may differ significantly from those of adults. The development of cognitive processes according to Piaget (1966) is discussed in a later section of this paper. However, one point will be made here. Piaget outlined several stages of cognitive development ranging from birth to adulthood. The structure of mental representations and consequent ability to understand or perform certain mental tasks differs between childhood and adulthood. Therefore, there are qualitative differences between thought during childhood and later years. An example of differences in qualitative thought on nature between children and adults is the concept of artificialism as

described by Piaget (1929). Artificialism consists of seeing objects in the environment as being the products of humans, rather than attributing self-creative abilities to the objects themselves. In the first stage of artificialism, everything in the environment is made or controlled by humans. An example of this comes from an interview of Roy at age 6--"What made life begin?"--"*We did, when we started living.*" (page 258). From approximately age 7 to 11, children view some processes as natural and others as human controlled. Around age 11, most children view human activities as separate from the processing of the rest of the environment. Based on the latter description of the stages of artificialism, it would appear that young children have limitations on their ability to distinguish natural objects from human-made. This may be true. However, it may also be true that despite the difference in the structure of children's conceptions and adult conceptions of what is natural and built, children may still be capable of sorting natural objects from human-made objects based upon their own definitional constructs that are not obvious to adults. To assume that the meaning and structure of the concepts of natural and built have to be similar between children and adults is an egocentric perspective to be avoided by adult researchers.

Second, children at age two and beyond are actively exploring the environment and learning about the function of environmental features (Gibson, 1969), such as types of features that accompany certain activities that occur. For example, natural environmental features may come to be associated with recreation and human built features with home or work activities. Assuming that most of Holcomb's 4-year-old subjects had been locomoting and learning about the environment through direct experience for at least two years, it is difficult to believe that they did not have some ability to differentiate between natural and human-built features. Again, perhaps the children do not differentiate the features based on adult standards of natural and human-built, but upon their own definitional constructs based on activities associated with those places or upon perceptual features not obvious to adults. For example, young children may believe that anything

outside of their home is "natural" including the seesaw in the yard, whereas anything in the home is "built" including the plants in the corner.

Further study is needed regarding the development of the concepts of natural and human-built environmental categories. The definition of what is natural may vary across the lifespan as the use and experience within different environments expands. A first step in this process is examining the variation in preference for natural and built features across age groups, as is considered in this study.

### Environmental Preference Measurement

There has been a search, since the 1960s within the fields of art appreciation, environmental psychology, forestry management, geography, design and architecture, to find an objective method to measure the relationship between stimulus qualities and preference. This search has allowed the development of several methods and terminology to describe stimulus qualities that affect preference. Gobster and Chenoweth(1988) found through their evaluation of fifty studies within the literature on environmental preference, that 1194 terms (e.g., complexity, mystery, coherence, vividness, etc.) had been used to describe visual aesthetic quality in landscape scenes! Upon examination for similarities in meaning, they were able to reduce the number to 114. Despite the great number of terms, Gobster and Chenoweth found that there was little discussion in the literature of the relationships among these terms, their effectiveness as predictors of environmental preference, or their utility for predicting preference across several types of landscapes. The emphasis in many of these studies seems to be on the development of reliable objective terminology, not upon assessment of the validity of the terms.

In searching for organizational structure in the mass of available terms, Gobster and Chenoweth found that there are three major strategies that characterize the study of environmental aesthetics. These include the expert, psychophysical, and cognitive strategies. The terminology associated with the expert strategy is criteria based on

judgments of artistic professionals. For example, Litton (1982) stated that environmental scenes can be described entirely by the terms unity, variety and vividness. Litton defines unity as "that quality of wholeness in which all parts cohere" (pg.284) where the parts of an environment are not what is important but the single harmonius unit is important. Variety is indicated by how many objects and relationships in the environment that are different from each other and vividness is defined by those distinctive qualities that make an environment different from any other. These descriptive terms have successfully predicted landscape preference (Arthur, 1977) but their validity is questionable. For example, the level of unity and variety of a scene cannot explain why a picture of the forest is preferred to a picture of a suburban mall, particularly when the level of unity and variety are equal in both scenes. It is clear that there is something more to visual aesthetics in the environment than descriptors used by professional artists when discussing formal art. In the forest vs. mall example it appears that the meaning of stimulus qualities carries great weight in preference decisions and can overcome any affective reaction to concepts such as unity or vividness. The context of the scene can influence the meaning of the qualities and therefore also carry weight in preference decision-making. For example, subjects who are told that a forest scene is a National Park will rate the degree of liking higher than those who are told that the same forest scene is a tree farm (Hodgson and Thayer, 1980). Here the level of unity, variety and vividness is the same because the same picture is used for both subject groups and yet preference is affected by the associated context. Therefore, content and context have an impact upon preference that is not incorporated by artistic descriptors.

The psychophysical strategy emphasizes mathematical relationships between physical features and perceptual judgments. For example, Berlyne (1960, 1971) studied the relationship between arousal, exploratory behavior, and aesthetic response by presenting stimuli containing various levels of complexity. By presenting subjects with random line patterns, he found an inverted U-shaped function between the stimulus complexity level (number of angles) and aesthetic preference for the stimulus. Although

complexity affects preference, this strategy ignores the content and context factors discussed above. Kaplan, Kaplan and Wendt (1972) believed that Berlyne ignored content when he utilized abstract line drawings instead of pictures of landscape scenes. When using landscape scenes, comparing the two categories of natural scenes vs. human-built scenes, Kaplan et al. found that complexity predicted preference within categories but not between categories. Therefore, all of the natural scenes were ranked higher than any of the urban settings, but within the natural and human-built categories the highest ranked scenes had the highest complexity levels. This result indicates that the content component, the degree of naturalness, was more important in predicting preference than the stimulus quality of complexity, although complexity has strong predictive value as well. Ulrich (1981) and Wohlwill (1976) have come to similar conclusions.

An example of the cognitive strategy, is the research of Stephen Kaplan (1987). He analyzes preference in terms of information processes, emphasizing that preference motivates the organism to gain information about the environment in order to adapt to the environment. Through his research he has developed three terms to describe the environmental scene. His term mystery means that certain qualities in the scene imply that further information can be gained if exploration into the environment occurs. An example of this type of scenic quality is the winding path that leads into a thicket of bushes. A coherent scene is one that has repetitive elements and unifying textures that allow for the cognitive process of organizing and compacting large amounts of information. An example of a coherent scene might be a log cabin in the forest where the qualities of the cabin, smoke from the chimney and the trees in the background are readily perceived because we expect those three qualities to "hang" together. A legible scene indicates that orientation and prediction of events in the environment will occur with ease. Therefore the sight of the path leading into the thicket would be legible only if it does not appear to be a confusing and dangerous place to go. Kaplan believes that these three informational dimensions will allow for exploration and understanding of the environment, information that will lead us

away from inappropriate environments towards desirable ones. Therefore, he would predict that environments that are high in coherence, legibility and mystery would be preferred based on the informational needs of the exploring human. The dimensions of coherence, complexity and mystery together have been found to account for 64% of the variance in preference (Kaplan, 1975). Legibility has not fared as well in predicting environmental preference. However, the success of the predictive ability by the coherence and mystery dimensions exemplifies the strength of including meaning and context in objective descriptors.

Many researchers downplay the use of psychological descriptors such as mystery and coherence, searching for the more "objective" terms within the physical and artistic domains, such as complexity level, that appear more dependable for prediction. In a search for the most effective descriptors for predicting preference, Gobster and Chenoweth(1988) correlated preference with three descriptor types, artistic, physical and psychological, on the same set of landscape scenes. They found that psychological descriptors correlated the highest with preference, although all of the descriptor types predicted preference at a reasonable level. Therefore, the psychological descriptors predicted preference as well as any of the more "objective descriptors", such as complexity. Some researchers have used all three descriptor types to predict scene preference. Ulrich (1983) upon evaluation of several studies of landscape aesthetics, organized a set of descriptors for the "ideal" landscape. The ideal or the most preferred landscape should have a moderate to high level of complexity and depth, a focal point, homogenous ground texture, mystery, low threat, and some water in it. The predictive ability of this particular combination of qualities has not been tested. However, it stands to reason that the use of all three descriptor types, where the psychological descriptors include meaning and context, should increase the ability to predict the relationship between stimulus qualities and human response.

Upon evaluation of the literature regarding environmental preference measurement, three problems emerge that were attended to in the course of this research.

1. There is a misdirected emphasis upon objectivity that ignores the relevance or generality of research results. R. Kaplan (1975) believes that in the scramble to find good predictors of preference, researchers often ignore the validity of their findings. Specifically, she found that in many studies the agreement between raters is very poor and the sampling of environments in type and in number is extremely limited. For example, a descriptor such as "vividness" may not be useful if subjects cannot agree upon its use, and the sample of environments used to test its effectiveness only includes forest scenes. Care should be taken to ensure the predictive value of terms in a variety of landscapes, as exemplified by the efforts of Kaplan (1975) to test the predictive ability of the terms of mystery, coherence and legibility.

2. Individual differences in response are virtually ignored. This criticism is echoed by Lyons (1983) who found that many studies of physical features ignore the fact that different preferences are expressed by people with different experiences. Specifically, preferences have been found to be different for subjects varying in sex, personality type, age, residence, occupation, and social class, although the precise nature of these differences has yet to be uncovered. In addressing this point, Wohlwill (1976) states that we "still lack information on systematic differences in environmental evaluation that can be related to individual differences along environmentally relevant dimensions of personality, cognitive style, attitude, and the like" (p.76). Perhaps researchers avoid dealing with individual differences, due to the complexity of individual experience or due to the need by environmental managers to predict preference for a large group of consumers. To these environmental managers an emphasis upon the desires of an individual would be senseless when it is the majority that needs to be considered. In the context of this study, however, it is suggested that knowledge of individual developmental factors would be much more effective for predicting preference than any isolated stimulus quality such as complexity. Once the relationship between individual developmental factors and environmental

preference are understood, managers can easily assess group needs by focusing upon the developmental experience of the specific consumer group.

3. Physical qualities are considered to be more important than psychological qualities in determining preference. The problems with such a conclusion are reflected in Kreimer's (1977) statement that many researchers assume that objective physical characteristics of the environment alone determine preference. But there are many factors that influence the process of perception and cognition such as the emotions, values and beliefs of the individual. The content or context of the environmental scene can influence the attitudes of an individual towards the scene, which in turn can influence the response to the physical stimulus qualities. Therefore, a physical quality like complexity does not affect preference in a simple manner. The perception of complexity is affected by the current mood of the individual and their salient beliefs and emotions about the meaning or content of the specific features in the scene and the context.

Pitt and Zube (1987) state that we know stimulus content is important because subjects are sensitive to the "coherence" in a picture, prefer natural scenes over human-built scenes, and because Kaplan's cognitive terms of mystery and coherence which are based on content, do predict preference. Kaplan (1975) concludes that, if we carry the physical quality emphasis to an extreme, while disregarding content, we will run into problems. With complexity for example, would we say that humans would be happy with an environment void of nature as long as the complexity was at the right level? Probably not.

It is suggested in this research, that stimulus content and the socio-developmental context of the subject are very important factors in environmental preference. Therefore, there is an emphasis upon the development of individual preferences for two categories of environmental content-- natural scenes and human-built scenes. Physical stimulus qualities, such as complexity, texture, depth of field, etc. and their relationship with developmental factors will not be considered due to the complexity of the interactions that would need to be considered. However, these relationships should be the focus of future

research efforts since designers and planners, in particular, need to understand the role of physical qualities in good design for human needs.

### Bias Towards Natural Features in Landscapes by Adults

The bias in preference among adults towards natural features as opposed to human-made features is evidenced in the results of several studies (Clamp, 1976; Coughlin and Goldstein, 1970; Evans and Wood, 1980; Herzog, Kaplan, & Kaplan, 1982; Kaplan, 1978; Nassauer, 1979; Wohlwill, 1976; Zube, 1976). For example, Kaplan, Kaplan and Wendt (1972) showed that the preference for natural features was not only higher than preference for built features, but that every natural landscape alternative was preferred over any urban landscape used for comparison. The bias for natural landscapes and natural features is similar, as shown by Brush and Palmer (1979) who found that subjects prefer the inclusion rather than the exclusion of natural elements in human-made settings. The addition of even the smallest amount of vegetation can increase expressed preference for a built scene (Thayer and Atwood, 1978; Ulrich, 1983) and the smallest amount of apparent human influence can decrease preference for a scene (Carls, 1974; Wohlwill & Harris, 1980). Lowenthal (1962) suggests that some people go so far as to assume that if they like the scene then it must be natural.

Even when natural features are not predictive of landscape preference then the subject at least uses such features as an important discriminating variable. For example, Palmer and Zube (1976) found that subjects made judgments about landscapes based upon a continuum, ranging from purely natural landscapes to human-made. Herzog, Kaplan and Kaplan (1982) found the same continuum is used in built settings, ranging from those settings with some natural features to those with no apparent natural features.

Although empirical support for the existence of bias towards natural features is strong for adults, to date there has been no concomitant research on such a bias in children. However, there is some support for the idea that children's favorite places to play (Francis,

1988; Hart, 1979) and adults' memories of favorite childhood play locations (Lukashok and Lynch, 1956) tend to be natural settings vs. built settings. Therefore such a bias may be present in children as well, but further evidence is needed on this issue.

### History of the Concept of Nature

The separation between the two concepts of natural and built and the bias for natural features have not always existed in human thought. Tuan (1978) wrote that during the 17th and 18th century, nature was thought to be based upon order and harmony and human built objects at that time were considered to be natural also. This was true until the early 19th century when the emphasis on harmony with the environment became a low priority during the construction of buildings throughout Europe. Many Europeans began to speak of two separate entities, built and natural.

Despite Tuan's point, there is evidence of bias in early writings that would indicate a tendency to conceptually separate natural objects from those of human production. The early Greeks wrote of the evils of the city and the value of escape into nature (Stillman, 1977) despite the fact that cities used to be monuments to political and religious values, and centers of art, culture, politics and economics (Altman & Chemers, 1980). Other historians emphasize that nature was not a place to escape to, but was a place to fear. This fear was displayed by the strong emphasis on reverence to mountains, water, sky, etc. in religious traditions. Nature became a place to interact directly with God or the devil depending upon the individual's point of view. A strong positive interest in nature occurred in 17th century Europe as the construction of gardens increased. Nature gradually became a place to seek solace, to be revered but not feared. Many of these changes were occurring due to changes in societal attitudes as industrialization progressed. Philosophers of the time, such as Rousseau and Freud, proposed that nature is morally superior to society, that natural instincts are to be valued despite the repression of such instincts by civilization or human

influence (Jeans, 1983). These changes in philosophy led to a new perspective on nature, that it is sacred (Chemers & Altman, 1977) rather than something to be feared or overcome.

As cities developed, the nostalgia for nature increased (Spirn, 1984), possibly because people no longer had to struggle to survive in the natural setting (Lowenthal, 1962). Art often reflects the prevailing attitudes, and in the 18th century human built settings became devalued as artists of the time began to avoid depicting industrial scenes and began emphasizing natural landscapes. The disdain for city life increased during the 18th century until late in the 19th century, the attitude towards undeveloped wilderness became such that nature took on an aesthetic and recreational purpose (Altman & Chemers, 1980) separate from the functions of the built setting. Western society has then moved away from a utilitarian approach to the natural environment, such as logging or farming, towards an aesthetic/recreational approach, such as photographing or camping in wilderness areas or preserving natural areas for their own sake. The role of the aesthetic/recreational value of nature is apparent when you consider the number of people who travel to natural areas on weekends or vacations, how many photograph the environments they travel to see, how many television programs and books are devoted to the topic of nature and how many people join clubs to help preserve the natural areas nearby. Indeed, nature must have a special role in society, because many people support such natural shrines as National Parks, and yet never directly experience them in their lifetime. Of course built objects also hold an important aesthetic role for many people, places such as the Egyptian pyramids, European castles or the defunct lighthouses along the East Coast of the U.S. are frequented by vacationers from all over the world. Therefore, nature does not stand alone in aesthetic value.

The point here is that the concept of nature has changed dramatically throughout time and that natural features have become highly valued as an aesthetic experience whereas the built environment in most cases has not fared so well. It is proposed that built settings have become associated with utilitarian purposes such as work or home life, and less so

with aesthetic or recreational functions. However, any general statement regarding the function of built and natural environments is in danger of disregarding the complexity of human interactions with the environment. The functions and values for specific environments are based upon beliefs and attitudes developed through learning and often culture. An example of this relationship is provided in a review by Altman and Chemers (1980). They found that beliefs and values regarding the environment in past and present history can be grouped into three different orientations: people as subjugated to nature, people as above nature and people as part of nature. Those who subscribe to the orientation of being subjugated to nature are typically dependent upon natural forces to keep their crops going and to maintain life. Those in less industrial areas or those in hazardous areas such as earthquake zones will tend to take this view.

The view that "people are above nature" originates in two philosophies. The Judeo-Christian perspective has proposed dominance over nature with statements such as: "The first commandment of God to man stated that mankind should increase, conquer the earth, and have dominion over all living things" (Genesis 1:28). Therefore, progress in the form of building farms and roads is doing God's work and taking proper control over what is rightfully human. But the scientific revolution has also made its own impact upon attitudes towards nature. In its drive to control nature, science has taught us to expect domination over nature:

> To control temperature, to cure illness, to raise food efficiently, to be able to kill animals and people in large numbers, to explore outer space, to build bridges over seemingly uncrossable rivers, to construct dams and massive irrigation systems, to settle "uninhabitable" land, and to mine the earth's resources all attested to the superiority and uniqueness of people. (Altman & Chemers, 1980, p. 20 )

The early Greeks who focused on harmony and balance with nature, as did many American Indian cultures, are examples of the "people as part of nature" perspective. This view is reflected in the belief that humans and the environment are mutually dependent at all times, that any change in one affects the other. This is the perspective that the current environmental groups propose to be the only perspective which will allow our species to survive in the future by realizing the significance and fragility of our relationship with the physical environment.

These are examples of only one aspect of human-environment relationships and suggest that such relationships are extremely complex. Despite this complexity, it is important to understand how current attitudes toward nature are being expressed, and in particular how they develop in children. If we as a society want to maintain a particular orientation towards nature for our own survival, then it is important to identify and describe the processes that pass such traditions on to the next generation.

### Psychological Benefits of Nature

Although strong empirical support is not available, nature may be important for healthy development of cognitive skills, fulfillment of emotional, social, and recreational needs. The idea that mental health is supported by experience in nature is an old one and occurs in various cultures (Ulrich, 1979). Ulrich (1981) provided empirical support for this notion. He found that showing pictures of natural landscapes improved several psychological states in mildly stressed subjects. When he compared psychological states prior to and following a slide presentation of urban or natural landscapes, he found that when natural landscapes were displayed to subjects, self ratings of mood improved, alpha brain waves increased indicating relaxation, and there was a decrease in the experience of sadness and fear arousal. The presentation of urban settings led to a non-significant trend towards lower well being, significantly higher self-reported sadness and significantly lower attentiveness. This research indicates that natural features carry information that has an

impact upon psychological processes that may be beneficial for many people. How does a natural setting come to have such an impact?

Part of the answer may lie within the natural feature itself. Driver and Greene (1977) suggest that nature as a stimulus provides diverse perceptual patterns, low noise, few ambiguous patterns and high predictability which are all stimulus qualities that are highly preferred by human subjects. These same qualities are not emphasized in the human-built stimulus, such as urban settings. Therefore, stimulus qualities can be involved in the original evaluation of a landscape which may lead to the development of positive affective-cognitive structures required for preference, and ultimately lead to psychological well-being.

The benefits expected from nature that become associated with natural features, are often learned through direct personal experience within the environment, recreational experience in particular. Knopf (1987) has reviewed the relevant literature and compiled a list of these benefits, such as psychological restoration, control over the amount of social interaction and competence development on specific skills such as climbing. Nature is also considered to be nonjudgmental unlike the boss at work, flexible enough to allow creative manipulation, symbolic of the spirituality of life, and to provide the large range of stimulus quality categories discussed above.

Kaplan and Talbot (1983) studied changes in attitude for 166 participants in the Outdoor Challenge Program in Michigan's Upper Peninsula during two weeks of backpacking. The participants filled out attitudinal questionaires prior to the trip, during the trip and following the trip and kept a journal throughout the trip also. Kaplan and Talbot found that with increased time in the wilderness, campers begin to feel an increased sense of purpose, increased self-confidence, an increase in the ability to separate trivial events from the significant, a sense of escape from monotony, a sense of continuity with life, and an increase in feeling tranquil, harmonious, and compatible with other people. Although

program participants volunteered for the study and were not chosen on a random basis, efforts were made to include a variety of people in the sample.

Bultena and Taves (1961) surveyed visitors to the Boundary Waters Canoe Area to identify the motives for visiting the wilderness area, and found that wilderness users value nature for sport or play, and for providing new experiences and a sense of heritage. Although the sample is limited to a specific set of recreationalists, the psychological benefits identified by these subjects may be similar to recreationalists involved in other outdoor leisure activities. In conclusion, there are many benefits that nature can provide to those who use it.

There is empirical support for the notion that natural environments are expected by subjects to provide different psychological benefits in comparison to urban environments. Moos (1973) had subjects complete a values questionaire for various types of environments including natural and urban settings. The values included statements such as the environment: presents a challenge to your strength, allows the chance to take care of yourself, allows the chance to take part in different types of sports, provides a different perspective on life, tranquility, relief from stress, etc. He found that subjects had significantly different expectations of achieving benefits from different environments. For example, the wilderness and not the home environment was expected to nourish personal growth, enhance a sense of self-identity, a sense of being a part of the life cycle, and lead to a feeling of spiritual uplifting. Moos found that the expectation for attainment of all types of benefits increases as the scale moves from indoor to outdoor environments. Unfortunately, it appears that the values provided by Moos were balanced more in the direction of outdoor recreational activities, e.g., chance to view wildlife. Therefore, the results may be biased in the direction of expecting more benefits to come from the outdoor experience. Setting aside this problem, the important point here is that if people expect to gain more psychological benefits from nature than from built settings, then such expectations may be self-fulfilling. Therefore, if people expect to feel tranquility by being

in nature then they probably will do so. The value of natural settings is made apparent then, since people need places to go where they can expect certain rewards to occur. However, it may also be true that the natural setting, apart from people's expectations, provides tranquility based on its special characteristics, and the built setting could never attain that same value.

**Children and Nature**

What is the value of nature to children? Based on evaluations of the literature, David and Weinstein (1987) state that nature fosters a sense of place, requires landmark use for locomotion which supports exploratory behavior, and develops social cooperation and privacy expression in children (these points are discussed in more detail in a later section). The sense of place is important because the development of sense of self is dependent upon having places that are "owned", familiar, useful and controlled by the child (Proshansky and Fabian, 1987). It is often the case that natural areas, such as an abandoned field, are much more easily "owned" by children than the nearby areas in the urban environment. The sense of place may be obtained in the built environment but is hypothesized to be a much more difficult process for the urban child than the rural child.

The development of landmark use during exploration of these "owned" places is important for wayfinding. Therefore the child who learns to use the landmarks in his/her neighborhood during play, will be able to move through and explore that environment and other environments more efficiently. And experience in the natural environment may allow a child to learn about social cooperation and privacy needs, such as the benefits of going to the river to think alone when frustrated or the benefit of cooperating with other children during play. Many writers agree upon these benefits that the natural environment may have for children, but unfortunately little empirical evidence is available as support.

The manipulability (e.g., the flexibility of play in environmental settings) of the natural environment has been a function emphasized by several authors concerned with the

cognitive developmental process (Clay, 1957; Cobb, 1959; Hart, 1973). Such flexibility allows for creative interaction with the environment and its features that is so necessary to cognitive development, such as the development of creativity and spatial knowledge. For example, a child who is able to manipulate resources such as dirt and water during play to make a dam, will have the opportunity to develop an understanding of cause and effect when the dam breaks, engineering techniques to keep the dam from breaking, or possibly group cooperation in completing the dam. The child with an asphalt playground is not afforded the same opportunity since the surface is not flexible enough to allow such learning experiences.

Wohlwill and Heft (1987) suggest that nature provides more alternatives during play due to the fact that natural areas are not only less structured but also are often self-selected by the child as he/she moves through their habitual exploratory range. The freedom of expression and interaction is supportive of cognitive developmental processes. Wohlwill and Heft (1987) suggest, however, that nature is not always positively valued by children. Natural areas can often be anxiety-provoking due to the darkness experienced in shadows by day and the extreme darkness experienced in the forest at night. Often natural areas may lack familiar landmarks such as the corner store or Mrs. Jones's flower garden. These landmarks are more familiar to the child of urban and suburban areas, whereas the landmarks provided in natural areas may be less obvious to a child who is not familiar with the natural setting. The lack of familiar landmarks leads to a sense of uneasiness during exploration due to fears of getting lost, although this same feeling of uneasiness may also be exciting to the child. Often in natural settings there can be a sense of social isolation that can be disconcerting to the child who is not familiar with the natural environment nor familiar with having privacy. The setting then leads to anxiety instead of pleasant feelings. These same feelings of anxiety may also be true of adults who are not familiar with the natural environment; however, empirical support for this conclusion is not available. The previous discussion has implications for the importance of an individual's experiential

history for future interactions with nature. Children who have many experiences with nature may see more landmarks that they can use in the future, be less anxious about wayfinding in natural settings, and be less uneasy about social isolation. Adults with a childhood history of frequent exposure to natural settings should be less anxious, afraid and uneasy in natural settings as well.

The discussion of negative values for nature assumes that such anxious feelings are not provoked by the built environment. This may not be the case, the built environment may also engender fear of the dark, uneasiness during wayfinding, and a sense of social isolation. Unfortunately, the urban setting and its value to children has rarely been examined by developmental psychologists so less can be said here to support the comparative disadvantages or benefits of human-made settings. However, Wohlwill and Heft do suggest that the city provides a higher number of available behavioral settings so that the child has a variety of places to choose from during work and play activities. The child has more varied opportunities for social contact in the city. The child can choose to be in a large, medium or small group or he/she can be alone. The city child has the option of interaction with various individuals based on different characteristics such as culture, sex, race, religion, and social class. Finally the urban child may have more opportunities to develop skills than rural children based on the increased cultural opportunities available in the city, such as programs, clubs, or classes that may not be offered in the rural setting. Again these are the evaluations made by Wohlwill and Heft; empirical evidence to support these conclusions is not available at this time.

If nature is important for all of these psychological needs, then is nature necessary for our survival as a species? If we continue with urban progress and disregard our need for nature will healthy development in childhood be hampered? At the current time there is little evidence in the literature to support a conclusion one way or the other. Alexander (1967) believes cities promote autonomy and withdrawal from others, that the lack of correspondence between urban form and human needs is leading to pathology. For

example, Milgram (1970) found that city residents are less helpful, polite, and more suspicious of others than are rural residents. McHarg (1969) found that social pathology, including suicide, homicide, rape, robbery, and juvenile delinquency occur at a higher rate in the center of the city than in outerlying areas.

Nasr (1968) states that "today almost everyone living in the urbanized centres of the Western world feels intuitively a lack of something in life. This is due directly to the creation of an artificial environment from which nature has been excluded to the greatest possible extent" (p.17). This is a suggestion that nature's presence is missed and perhaps needed. Is there such a thing as an ecological niche that is important for our survival--a preferred perceptual world in which we function best? Perhaps our strong bias towards nature represents that preferred perceptual world or ecological niche.

In contrast, Holcomb (1977) suggests that nature is not necessary for healthy development of cognitive, social or emotional skills because many of the same features of nature, such as manipulability, can be found in the urban setting (e.g., pipes used to crawl in, old buildings used as forts, water fountains used to play with water, weed covered lots). However, there is no empirical support for this statement. Mehrabian (1976) has discussed the culturalist perspective that proposes that nature does not provide psychological benefits that are distinct from other environments. Therefore it is suggested that cultural activities such as music, art, or travel that are experienced in the built setting, can provide similar psychological functions of activities in nature.

Perhaps nature has a singular role in supporting these significant psychological benefits, whether it is based on its own characteristics as a type of environment or whether it is based on people's expectations. Perhaps nature does not have a singular role and its value with regards to our survival as a species is minimal. Empirical support for either perspective is lacking at this time.

In conclusion, despite a limited empirical research base, nature appears to have an important role in physiological arousal and recreation as well as cognitive, emotional,

spiritual and social development. Although a considerable list of benefits of nature has been provided here, it is not clear from the literature how the appreciation of these benefits might develop and when individual differences might be expressed. The development of this appreciation would depend upon cognitive and emotional processes intertwined with experiential factors. The current research proposal is concerned with these particular processes. Teale (1966) states "nature affects our mind as light affects photographic emulsion on a film. Some films are more sensitive than others; some minds are more receptive." The question remains, what are the developmental factors that lead to some minds being more receptive to the benefits of nature?

## The Development of Environmental Preference

### Nature/Nurture Issues of Environmental Preference

Much of the research in environmental preference is based upon a specific position regarding the origin of environmental preference, whether we are born with environmental preferences or we develop environmental preferences thoughout the life span based on learning from experience.

### Innate Biases

Various researchers (Appleton, 1975; Driver and Greene, 1977; Kaplan, 1987; Rabinowitz & Coughlin, 1970; Ulrich, 1973, 1977) take an evolutionary approach which assumes that we are born with an innate predisposition to prefer landscapes of our evolutionary origin. Statements such as those of Knopf (1987) who summarized the evolutionist position by saying that "humans have an innate preference for the particular patterns of stimulation that natural environments carry" (p. 784), and by Driver and Greene (1977) "modern man has a strong innate predisposition toward nature which is activated by familiarity with or understanding of, natural settings" (p. 64), exemplify this approach.

There are several theories that are based on the evolutionary approach but only three will be discussed here. Habitat theory (Appleton, 1975; Dubos, 1980) proposes that we derive aesthetic satisfaction from viewing those landscapes that appear to afford the achievement of our biological needs. Therefore, a landscape feature that afforded protection from hazards, such as a cave, or afforded foraging and drinking, such as a lake, was sought after and preferred by our ancestors. It is suggested that those survivors were selected for based upon the expression of preference, and today the genetic predisposition to prefer specific natural features continues despite the fact that some preferences may no longer be essential for survival. Several authors (Balling and Falk, 1982; Rabinowitz & Couglin, 1970; Kaplan, 1977; Zube, Pitt & Anderson, 1974) have found support for this conclusion, finding that subjects prefer savanna-like settings (areas of grass with clumps of trees) where openness and seclusion exist simultaneously. The savanna is proposed to be the type of landscape that human beings evolved in, once they descended from the trees. Interestingly, the preference for savanna settings over other types of landscapes such as forest or desert, is especially high in 8-year old children (Balling and Falk, 1982). Coss and Moore (1990) found a similar connection between the ecological significance of finding water in the environment and water preference. This research finding is less ambiguous since it is clear that finding water is essential for survival and this need is reflected in a strong preference for water in landscape scenes and stimuli that mimic the features of water, e.g., glittering jewelry, slick surfaces. Both research findings, strong evidence of water and savanna habitat preference, may be interpreted as supportive of a genetic component to preference.

There is also support from the field of animal behavior for the hypothesis that preference has a genetic basis. One example is the research on habitat preference by woodland and prairie mice. Wecker (1963) found that preference for a specific habitat (e.g., shady vegetation by woodland mice) remained in mice, despite the fact that for 20 generations none of the mice experienced that particular habitat. The habitat preference

appeared to be based upon temperature difference caused by the shade of the plants and not the plants per se. Therefore habitat preference does not need to be based on visual qualities alone. Although these results are not necessarily generalizable to other species, the study does suggest that environmental preference in some species can have an underlying genetic basis.

Appleton's (1975) prospect-refuge theory is a variation of the habitat theory. He suggests that our preference for high places when viewing the landscape is related to the fact that climbing trees or other elevated sites in evolutionary history afforded prospect over the landscape and hazardous events occuring there, whereas our preference for covered areas is based on the need in the past for shelter from hazards. Therefore, this theory is based on three types of symbolism, hazard, prospect and refuge. Hazards are symbolized by threats from animate or inanimate objects, prospect is symbolized by situations that allow a view of the landscape and refuge is symbolized by escape from potential hazard. Landscapes displaying prospect or hazard will lead to attentiveness and tension in the observer which is a different aesthetic response to the relief felt when viewing a landscape that affords refuge. This theory is a refinement of the habitat hypothesis in that the primary emphasis is on the ability to see without being seen (as in sitting in a tree watching for predators or prey) which was a direct link to the satisfaction of biological needs in the past, and a direct link to aesthetic satisfaction in modern man. In modern man this need to see without being seen is displayed when we sit with our backs to the wall (refuge) in a restaurant in order to view (prospect) other people, or when we construct large picture windows (prospect) in the front of our house to view passersby and enclose (refuge) our backyards to enjoy our privacy.

Stephen Kaplan's (1975, 1979) information processing approach emphasizes the adaptive basis for much of our preference expression also. He believes that preference developed as an intuitive guide to behavior, that preference motivates the organism to gain information about the environment in order to adapt to the environment. He proposes that

humans have a need to recognize the environment in order to make decisions in the immediate situation or in the future. Preference is a motivator in that the emotional component of preference draws people to be attracted to or repelled by a feature and the cognitive component of preference allows people to organize information from the environment. With this information people can then find their way through an environment, locomote without danger and find food and shelter. If such information is not obvious in a landscape scene, then Kaplan proposes that we will prefer those features that imply that further information is on the way. Thus the path curving around the bend, implies that further information about the landscape is around the corner, and a curving pathway is a landscape feature that is often associated with a high degree of liking. Kaplan's point here is that the fact that many people prefer trees, water and vegetation in scenes, is due to the information they afford and not the perceptual form per se.

Finally, if S. Kaplan (1987) is correct in stating that preference is based upon the interaction between emotion and cognition, then we can look to the universality of these processes for support for the nature side of the issue. Ulrich (1983) points out that many emotions have been found to be universal and argues that there is no evidence that there are any cultural differences in basic perceptual and cognitive processes. If such processes are universal, then perhaps their interaction leading to environmental preferences may also be universal. This implies that there may be a genetic basis to environmental preference, however there is no direct evidence to date to support such a claim for humans.

### Cultural Biases

From the opposite end of the nature-nurture continuum are the culturalists who believe that experience mediates environmental preference. This approach emphasizes the role of culture and learning in the development of preference and has been the dominant view held by most researchers. Chemers and Altman (1977) point out that different cultures view the environment differently because they value different features for different

uses. So it follows that the attitudes about the environment must differ between cultures also. Although there is historical analytical support for the absence of a universal orientation toward nature (Glacken, 1967; Nash, 1973; Stillman, 1975; Tuan, 1974) there is no empirical support for such a view, nor is there much empirical support for cross-cultural differences in preference itself. There are two available studies on cross-group differences in preference. Sonnenfeld (1968) found that Eskimos prefer barren and arid scenes, whereas temperate-climate subjects preferred temperate scenes with which they were familiar. In contrast, Shafer and Tooby (1973) surveyed campers from several different cultures around the world who were camping in Scotland, and found a high agreement of preference for rural and wilderness landscapes. The level of agreement was so high that rankings were almost exactly the same between subjects. Both of these studies had such limited samples that is difficult to generalize to the rest of society, particularly when only recreationalists who camp in the same area are sampled. The contrasting results suggest that better sampling is needed in future research, but also the results suggest that the culturalist position is not empirically strong as of yet.

Culturalists believe that familiarity leads to a preference for specific environments. They point to the fear many people feel when they are encountering a natural setting and ask how could natural preferences be innate? Why is it that positive affect for nature is often found to be an upper-class expression (Foresta, 1980; Sills, 1975) if preference is supposed to be universal? Familiarity with environments seems to be a key part of preferential expression and this will be discussed in more detail in the following section. The basis for familiarity is, of course, the learning process. Researchers have found that children are dependent upon the teachings of adults for their preferences for art (Taunton, 1982), and nature (Holcomb, 1977; Marcus, 1977). Through this learning process we come to know specific environments and to label them in order to organize our thoughts about them. This labeling process may lead to a dichotomy between "natural" and "human-built" features that is not at all dependent upon any innate understanding of affordances or

functional values for such features. The importance of such labeling is exhibited by the research of Hodgson and Thayer (1980) and Nash (1973). These researchers found that labels attached to pictures can change the adult subject's expressed value or preference for that picture. For instance, if a picture of a group of pine trees is labeled as a tree farm, then subjects indicate a significantly lower preference than if the same picture is labeled as a National Park. Therefore, labeling and learning processes can have a significant impact upon expressed preference.

Each of the discussed approaches has its problems. The evolutionary approach is often based upon assumptions regarding adaptive functions of human-object relationships that no longer promote survival, at least in an obvious way. Therefore it is difficult to ascertain the "real" truth as is often the case in sociobiological research. Furthermore, the emphasis upon evolutionary explanations may be leading us astray. Perhaps an emphasis upon the neurophysiological support for genetic predispositions to prefer certain types of stimuli would be much more helpful since the methods in neurophysiology are much more developed than those of sociobiology. For example, Rolls, Baylis, and Hasselmo (1987) studied pattern recognition, specifically face patterns, and found that approximately half of the cells in the temporal lobe and amygdala are responsive to face patterns. Such an emphasis in brain organization on the important task of face recognition implies that a preference for face-like stimuli has been translated from ecological significance to neurophysiological significance. This is the type of direct evidence that is needed to support the nature side of the developmental equation. The culturalist approach is weakly supported by empirical research and as Ulrich (1983) found in his own evaluation of the literature, there are often more similarities between cultures than differences. Further research on both perspectives is needed.

In the current study, it is suggested that preference develops based on an interaction between innate and learned processes. Therefore, a perspective similar to Lehrman's (1970) is taken here. Lehrman proposes that genetic and environmental factors influence

the development of the same elements, namely preference, and it is impossible to determine which factors are innate and which are learned since much of the learning process is dependent upon innate components. Lehrman further states that the focus should not be upon the interaction between nature and nurture. He argues, the emphasis should be placed instead upon the interaction between the environment and the organism at various stages of development. The organism is viewed as an active participant, altering its behavior as it develops by learning about the physical properties of the habitat. Therefore, whether preference is ultimately innate or learned is less important than the understanding of the maturational process of preference throughout the lifespan. This is an emphasis of the current research.

How the perceptual, cognitive and emotional processes come to be associated with the features of the environment is beyond the scope of this research. With regards to the current study, it is proposed that preference decisions begin with an evolutionary bias toward responding to specific environmental features and develop based on processes that occur during learning. This learning occurs during the individual's experience in environments coupled with vicarious exposure through the environmental preferences of family members surrounding that individual. The learning process moderating the natural biases toward specific environmental features is discussed in more detail in a later section so it will not be dealt with here.

### Familiarity and Mere Exposure

> "Although there may be an innate bias to prefer savanna-like settings, most Americans do not live in natural savanna environments. The familiarity that comes from growing up, living, and working in or near a particular floristic community may progressively modify an intial preference for savanna." (Balling and Falk, 1982, pg. 10)

As stated previously, familiarity with an environment has been presumed by some to lead to preference for that environment, presumably due to learned associations between encountered environmental features and cognitive, emotional, and perceptual factors. Attneave (1957) proposes that familiarity with an object occurs because we tend to group visual images of arousing features of that object into a single cognitive representation, particularly with repeated exposures to that object. It is proposed that not only objects but environments are also placed into affective-cognitive structures upon repeated exposure, and become familiar. Since the premise of the current research is that familiarity with an environment can lead to specific attitudes as an adult, the role of familiarity in preference will be examined further.

There is conflicting evidence regarding the role of familiarity in environmental preference. Some researchers have found a positive correlation between familiarity and preference (Hammitt, 1981; Herzog, Kaplan, & Kaplan, 1976; Lyons, 1983; Sonnenfeld, 1967). Others have found no correlation between the two factors (Balling & Falk, 1982; Kaplan, Kaplan & Wendt, 1972; Seung-Bin Im, 1984; Wellman & Buhyoff, 1980). The conflicting evidence can, in large part, be blamed upon methodological differences between the studies listed. First, the type of landscape used varies between studies. Different studies emphasized urban settings, natural settings, home biomes, or non-home biomes. The setting emphasized may lead to very different conclusions with regards to familiarity. For example, it is proposed in the current study that preference for natural environments is not dependent upon large amounts of experience, that there may be some innate components leading to such a preference. Therefore, when Balling and Falk (1982) found no correlation between familiarity and preference, the result may be due to the fact that they only presented slides of natural environments, environments that are possibly preferred from birth onward. It is proposed, however, that familiarity is particularly important for preference of built environments. This expectation would explain the Herzog et al. (1976) findings that familiarity is the primary factor that accounts for preference of urban places.

The point here is that the relationship between preference and familiarity may be dependent upon the type of landscape that is being sampled, and conflicting evidence will be obtained when this factor is ignored.

Second, the operational definition of familiarity varies from one study to the next. Familiarity can be defined as the number of times a subject views a scene (Hammitt, 1981) the types of experiences had in the environment (Tuan, 1974) or verbal expression of level of familiarity with an environment (Lyons, 1983). Conflicting measures of familiarity can lead to conflicting results regarding the familiarity-preference relationship. The most typical assumption is that if the person lives in a specific area, then they are "familiar" with that area. For example, subjects are often categorized according to urban, suburban or rural residences and familiarity with that type of area is assumed (Kaplan et al.,1972). However, this assumption is dangerous in that the amount and type of experience within the same biome can vary greatly from one individual to the next. One suburban individual may spend more leisure time inside the home than another suburban individual who is frequently involved in activities in the wilderness areas of the same biome. The use of a residence category is not a sufficient measure of what environments the individual is familiar with and the lack of control for this variable could lead to conflicting results.

Although it has been suggested that preference is dependent upon developing familiarity with an environment through specific amounts or types of activities, other researchers propose that merely being exposed to the environment will increase preference. Prior to explaining Zajonc's (1980) mere exposure theory, it is important to clarify his assumptions. He suggested that affect is the first response to an environment, which has a large impact upon preference, while cognitive processes come later. This is supported by Ittelson (1973) who states that approach-avoidance is the initial response to the environment which controls future experiences in that environment. Affect has an important role because the orienting response must make an object more attractive in order to increase the chance of becoming familiar with the object.

Zajonc believes that affect towards an object is often separate from the cognitive response to that object. For example, affect can occur faster than cognitive judgments about the object. He further differentiates affect from cognition in preference by stating that one's affective response to an environment is involuntary, immediate, and nonverbal, a combination of features exemplified by the typical response to biting into a sour apple. Finally, affect can be separated from the meaning of an object, which is within the cognitive realm. An example of this separation is in the situation where we can't remember the plot of a movie but we know that we liked it or not. Therefore, with merely repeated exposure, emotional evaluations about an environment could occur without the necessary accompaniment of cognitive processes.

Zajonc (1968) provides some evidence to support his claim. For example, nonsense words which presumably carry no prior emotional meaning were presented repeatedly to subjects, who rated the words on a bad-good scale. This repeated presentation resulted in higher ratings of the nonsense words on the "good" end of the scale. Therefore, positive affect accrued despite the fact that cognitive processing could not occur, presumably due to the fact that the words had no meaning. Unusual color combinations, certain types of music or faces of men that are unusual, also come to be rated higher with repeated exposure. Zajonc points out that the increasing positive affect is not necessarily related to recognition of the object, since in many of these tasks, recognition was not required of the subject. This is a large assumption because although subjects may not be instructed to use recognition in the task, they may attempt to organize the information through recognition and rehearsal anyway. Therefore, the recognition factor may be involved in the process of mere exposure despite Zajonc's attempts to ignore it.

There are many problems with Zajonc's theory of mere exposure. First, much of his evidence is based on the preference for words, particularly nonsense words, which may not be generalizable to other objects or events. Second, his theory does not attempt to explain the development of contempt through familiarity. He virtually ignores the existence

of negative affect towards objects and how repeated exposure to something disliked will not lead to preference. Third, if repeated exposure increases preference, then preference for an object should increase or at least stabilize across the lifespan. However, certain types of environmental preferences have been shown to decrease significantly during adolescence, only to increase again in adulthood (Balling and Falk, 1982 (see p. 17); Lyons, 1983 (See p. 502)). It is not clear how Zajonc would explain away this effect.

S. Kaplan (1987) disagrees with the basic premise of Zajonc's theory. Kaplan believes that affect can lead to preference but that much of the time cognition mediates this process. He proposes that an unconscious and very quick cognitive process occurs prior to affective judgments. The fact that a particular cognitive process occurs out of our awareness does not mean that such a process is not occurring at all, as Zajonc seems to suggest. However, Kaplan and Kaplan (1983) do agree that familiarity and preference are related. They suggest that familiarity simplifies the cognitive processing of an environment and allows the mind to take in more information at once, assuming "old" information takes up less space in attentional processes. Therefore, with repeated exposure the cognitive processes become more compact because much of the incoming stimulation is recognized. However, with repeated exposure there is a danger of becoming bored with the stimulus. The authors have organized a matrix that organizes the interrelationships between familiarity and preference. Low familiarity combined with low preference can lead to a fear of novel experiences whereas low familiarity with high preference can lead to high levels of arousal and curiousity. High familiarity combined with low preference can lead to the boredom mentioned previously whereas high preference and high familiarity can lead to a comfortable feeling much like returning home. This matrix exemplifies the complexity of the relationship between familiarity and preference even without the various individualistic variables considered in the current study, such as sex, residence, leisure time activities, etc.

It appears that the underlying processes and the role of familiarity in preference are undefined at present. However, as Wohlwill (1976) points out "what limited evidence we

have, suggests that individuals are apt to prefer types of landscapes closely resembling those to which they have become adapted". This evidence he refers to are the isolated studies of Hammitt (1981), Herzog, Kaplan, and Kaplan (1976), Lyons (1983) and Sonnenfeld (1967). Hammitt found that subjects preferred those landscapes that they rated highly for familiarity, after directly experiencing those landscapes on a short hike. Lyons found a significantly higher preference for deciduous forest vegetation over coniferous forest, rain forest, savannah and desert environments in subjects from areas that are predominantly deciduous forest. Other groups drawn from other types of biomes showed a similar relationship between familiarity and preference. Sonnenfeld found that subjects highly prefer landscapes most similar to their home biome also. Herzog et al. (1976) found preferences for urban places was related to the familiarity ratings for each place.

Although these studies support the notion of a relationship between familiarity and preference, as previously mentioned there are studies that have obtained contrasting results. Methodological differences prevent drawing a firm conclusion at this time. The current research proceeded based on this limited evidence, assuming that preference is dependent upon the process of becoming familiar with the specific environments available to the subject, and taking a perspective closer to that of Kaplan than Zajonc's mere exposure theory.

### The Physical Environment and Child Development

Currently, many researchers consider the physical environment to have an important influence upon development, an influence that is as important as the social environment of the child. Berry (1970) considers the "ecology" of the individual as a factor that influences the development of perceptual skills and personality along with cultural, socialization, nutritional and genetic factors. However, in previous decades of research, the physical environment was disregarded as an important experimental variable to control, and any influence it might have upon behavior was considered to be minimal.

The study of the impact of the environment, broadly defined, upon development began with the nature-nurture controversy, while the role of the physical environment specifically gained prominence with Barker's (1968) work on ecological psychology. Barker and Wright (1966) conducted a descriptive study of the behavior of one boy for one day. Barker made a point to step out of the laboratory and move away from its accompanying methodological constraints in order to gain information about the impact that context can have upon behavior. This context is the "ecology" of the individual, a large part of which is social but the physical environment plays an important role as well. The novel emphasis upon context and the physical environment has had a great impact upon psychological research in general.

Today, Bronfenbrenner's (1979) research continues the concern with the influence of context upon behavior with focused study upon the interaction between environment and development. Bronfennbrenner has hierarchically organized the various contextual factors important for socialization such as school, community, family, church, peers, media, culture and societal ideology. He proposes that studying the individual separate from any of these natural contexts is a method that ignores major forces in an individual's life. For example, the preschool child spends part of the day at school and part of the day at home. The school context can have an impact upon the child's behavior at home, and the home environment can have an impact upon behavior at school. There is a reciprocal influence between the two environments that must be considered; neither environment is isolated in its influence. Research focusing only upon the child's behavior at school would lead to false or weak conclusions since the child's entire ecology was not being considered. Admittedly, this type of model requires much more time and effort to use in research, because more variables need to be considered when including the influence of more than the immediate context. However, this model is valuable in that it avoids simplistic conclusions about environmental experience. With regards to the current proposal, Bronfennbrenner's emphasis upon context is support for the notion that the physical

environment in general influences development but also that the interactions between family life and the physical environment are part of the complex web of ecological factors that influence development.

It is clear that experience in the physical environment as a child is significant if we ask adults to remember and describe their childhood experiences (David and Weinstein, 1987). The memories that they describe are vivid with regards to the environmental features that were within the various contexts for social behavior, features such as lawns, trees and water (Lukashok and Lynch, 1956). But what value does environmental experience have for the developing child? Based upon their evaluation of the literature, David and Weinstein concluded that the childhood environment fosters a sense of place. Proshansky and Fabian (1987) have suggested that the development of place identity is important, an identity that is based on physical world socialization processes. The child develops place identity and a sense of self in that place because the place becomes familiar and "owned" in the sense that they are controlled by the child. Place identity develops through memories, thoughts, values and preferences that are attached to a setting. The social meanings that others attach to the settings can also socialize a child to a particular place.

David and Weinstein (1987) found in their evaluation of the literature that the environmental experience is important for developing competence in spatial exploration and competence in social interaction or privacy behavior. Moore (1983) also suggested that environmental experience increases competence during exploratory behavior, social interaction and increases cooperation among children. White (1959) has emphasized that the drive to be competent is one of the basic motivators of behavior, a drive which is especially important during childhood. With regards to spatial competence, experience in the environment allows children to develop the ability to wayfind by efficiently learning about a place so that it becomes familiar and to explore novel areas without getting lost. Landmarks and boundaries must be learned by children in order to accomplish these goals,

a process that depends upon environmental experience (Acredolo, 1985; Golbeck, 1985; Siegel and White, 1975). This point is exemplified by the research of Pines (1973) who found that those children that are allowed to explore, play with a variety of materials, and move throughout the environment showed a higher competence in the intellectual and social abilities required in school environments than those who were limited in movement by playpens and gates. The environmental experience is also important in the development of social cooperation. Hart (1979) completed structured interviews of children in one particular town, in which he noted the specific areas that each child preferred. Many of the children preferred areas where social activities could occur, the primary spot for most children being the baseball field. Presumably certain types of social experiences cannot occur if alternative environments similar to a baseball field do not exist in a community. The need for privacy is also relevant for development since children need to learn when and how to limit social interaction (Altman, 1975).

The discussion here has dealt with only a few examples of how the physical environment can impact development. Bunting and Cousins (1985) in their summary of the literature suggested that interaction with the environment during childhood influences cognitive, emotional, personality and attitude development. It appears then that the physical environment experience during childhood has an influence upon development in many ways.

How does development proceed with regards to the functional environment and environmental features? According to Searles (1960), normal development is dependent upon two primary interactions with the environment--developing a sense of unity with the environment and yet differentiating the self from the environment. These primary interactions are separate developmental processes that are dependent upon the cognitive level of the child for maturation. The child must develop place identity (Proshansky and Fabian, 1987) to develop a sense of unity with the environment. Place identity is a physical world socialization process that is an active effort on the part of the child to

internalize environmental features in the form of cognitions that include the meaning of the features to the child but also the child's emotions and attitudes toward them. This active process allows the child to develop unity and a sense of attachment to the environment.

The child must also learn to dissociate himself/herself from the environment. As the child learns to distinguish "self" from the external "other" (external social and physical environment) he/she will learn to associate negative, positive or neutral emotions to objects and settings (Proshansky and Fabian, 1987). As these associations multiply, the child will then develop the ability to separate self from other, separate the social from the physical environment, and to distinguish different types of environments based on the utility of their features.

What we perceive to be "the environment" is based on our way of receiving information about the world, and organizing of that information prior to recall. Therefore, the same photograph of a landscape can be shown to two different individuals and they will perceive two different "environments" due to dissimilar perceptual and cognitive organizational structures. The same is true between children and adults. Children have different organizational structures from adults that may lead to different environmental attitudes and preferences. We know that such qualitative differences between children and adults exist from the empirical research supporting the comprehensive theory of spatial cognition development by Jean Piaget, as discussed in Piaget and Inhelder (1967).

Piaget studied the development of the intellect during the 1920's. He and his followers take the "constructivist" position which is based upon the notion that children are active and curious explorers who respond to the environment according to their current understanding of the environmental features. Therefore, the "functional" environment to a child, is that environment that they have "constructed" in their minds based on the available perceptual and cognitive structures. He called these cognitive constructions "schemas". The ability and desire to organize cognitive schemas is considered to be innate and early in

development children spend much of their time taking in new knowledge and rearranging their existing knowledge to produce more complex structures.

Piaget believed that all development is an interaction between maturation, socialization, the organism and its environment (Hart, 1979). He proposed that the child actively constructs schemas in order to adapt to the external environment. The adaptation to the environment comes about by active efforts of the individual to balance thought processes with environmental events. Piaget proposed that there are two processes that the individual uses to maintain this balance, **assimilation** and **accommodation**. During assimilation the child interprets new information in terms of existing schemata. For example, most infants "know" the world through use of the mouth and the action of sucking, from the experience of feeding. The infant who is presented with a rattle for the first time will typically apply the existing "sucking" schema, and attempt to stick the rattle into the mouth. In isolation, assimilation would severely limit our ability to understand much of the environment, since every experience would need to be interpreted by the "sucking" schema. However the process that balances assimilation is the process of accommodation. During accommodation the child modifies existing schemata to adapt to new information. For the rattle example, in order to accommodate, the infant would modify existing cognitive structures such that a "grasping" schema is developed. It is through the product of the assimilation and accommodation processes that intellectual functioning develops. We are constantly adapting to our environment by manipulating the incoming information or by modifying our schemas, an active organizational process.

Piaget believed that intellectual development proceeds in stages that are composed of qualitatively different cognitive abilities. Each successive stage builds upon the previous stages and the higher stages represent a higher level of reasoning. The first stage, the Sensorimotor stage, exists from birth to approximately 2 years. During this time the infant "knows" the world according to his/her sensory and motor abilities. The sucking and grasping schemas are good examples of this type of knowledge. The sense of unity with

the environment mentioned previously, is particularly strong at this time. The child believes that what he/she perceives is a part of the self, therefore when he/she leaves the room, objects no longer exist. By the second stage, the Preoperational stage from age 2 to 7, the child has become able to coordinate complex sensorimotor information and is able to separate self from the environment. Objects can now exist despite the fact that they are not in immediate awareness. Children in this stage are becoming proficient at using mental symbols to understand the environment. The environment can now be internalized and understood in the form of symbols such as language or mental representations which are internal "images" of the environment. This means for example, that children use spoken language to communicate their thoughts to others and can think about events in the past using mental representations of those events. This is a significant development over the previous stage. However, the thinking of the child in this stage is influenced by egocentricity. The child believes that everyone sees the world in the same way as he/she does, that there is only one perspective. Due to this egocentric viewpoint, the child in this stage can only think of environments from the current perspective and cannot readily coordinate spatial relationships mentally, as evidenced by limitations in map reading and drawing skills (Gould, 1973).

From 7 to 11 years the child is within the Concrete Operations stage. The ability to learn and use cognitive operations develops at this time. Operations are mental activities that are performed on thoughts, activities that allow the understanding of relationships between objects and events in the environment. It is during this stage that children begin to learn to coordinate spatial relationships, such as the relationship between their house and the rest of the community. The limitation in thought at this stage is that the child is constrained to thinking about concrete objects and events. Abstract thought is not developed until some time into the Formal Operations stage, 11 years and beyond. The ability to use abstract thought means that a child can ponder hypothetical issues and use deductive reasoning, skills that are not possible prior to the Formal Operations stage. The

child of this later stage can coordinate very complex spatial relationships, as indicated by their advanced ability to map out familiar and hypothetical spatial relationships (Gould, 1973).

In regards to this research, Piaget's theory is a helpful guide to understanding the development of environmental attitude. His theoretical perspective about the child's active role in development and the constant reciprocal action of people and the environment on each other, is part of the theoretical basis for the present study. Furthermore, it is clear that the assimilation and accommodation processes are relevant to the process of environmental attitude formation, particularly during the process of affective bonding for place identity formation. In order to form an affective bond the child must learn to recognize a familiar environment, a process that may occur through assimilation. The child must also learn to recognize a novel environment and accommodate existing structures in order to effectively approach the new environment in an adaptive way. Finally, Piaget's stages of cognitive development are helpful guides to understanding the underlying thought processes that accompany changes in environmental attitude formation. The concrete operational child will have a very different perspective from the sensorimotor child, and Piaget's theory can be used to explain these differences. For example, the mental representations that become available as a tool to the preoperational child allow that child to represent the landscape such that he/she can more efficiently locate objects and move through the physical environment. The representation also provides a general frame of reference for relating the self to the landscape (Hart, 1979). Presumably once the skill of mental representation develops, the child's attitude towards the environment changes dramatically because the understanding of the environment is more advanced.

The theory is less helpful as a guide to understanding how the attitude towards and the use of environmental features change throughout development. Hart (1979) suggested that Piaget focused more upon children's conceptions of relations between objects rather than their knowledge of the objects themselves. Empirical research is lacking on children's

knowledge of specific places or other place experience factors such as approach or avoidance of specific places (Hart, 1979). Therefore, this research is exploratory in that it emphasizes the development of the concept of functional environment by studying factors that are influential in developing environmental attitudes.

The discussion will now turn to the development of preference for specific environmental features. Wohlwill (1983) stated that the concept of nature is dependent upon the individual's prior experience, a point that was discussed on a general level in a previous section. For example, children's impressions of nature have been found to be influenced by the stereotypes of plants, animals and landscapes presented in children's reading materials (Marcus, 1977). In contrast, Moore and Young (1978) point out that it is surprising that children express such a strong preference for nature in studies such as Balling and Falk's (1982) despite the fact that the average North American child has had only minimal experience in natural settings. However, Tuan (1974) believes that this strong preference is initially based upon the learned association between nature and recreational activities, an association he assumes can be made with minimal experience in the setting.

Attitude formation is not entirely dependent upon indirect learning through the media or family activities, the history of direct experience within a setting can also have a great impact upon development. With the repeated use of a specific environment (not only through mere exposure), an affective bond is developed (Jacob & Schreyer, 1980; Lee, 1972; McDonough, 1982; Newby, 1979) and as this bonding process continues, the environment becomes represented less by its physical characteristics and more by the memory record of past experiences (Tuan, 1974). Therefore, it appears that attitudes towards a particular environment as an adult are in many ways dependent upon the memory of childhood experience and the affective bonds to specific places.

Wohlwill and Heft (1987) point out that empirical evidence to support this notion is lacking, but that impressionistic evidence is easy to find (Cobb, 1959; Lukashok and

Lynch, 1956). There is sketchy information available about how urban and natural settings differentially affect children. However, because the two settings differ in so many ways, we can expect the developmental experience to be different, resulting in differing attitudes as adults.

There is some evidence that preferences for landscapes and the activities that are associated with those landscapes as adults are related to early experience, however, the generalities of the findings are limited due to a narrow range of subjects. For example, Burch and Wenger (1967) studied campers from urban and rural settings, in order to determine the similarities between the style of camping during childhood and adulthood. They found that activities in specfic environments that were considered to be pleasant during childhood are attractive to the same people as adults. Bevins (1968) surveyed hunters and found that positive childhood experience of doing that activity in the outdoors setting was listed as being the primary reason they continued the behavior as an adult.

It may be true that those who spend more time outdoors as children learn to value environments in general. For example, Lyons (1983) found that those who spent the most time outdoors, showed the highest preference overall for all types of landscapes. Balling and Falk (1982) found that childhood experience outdoors correlates highly with deciduous forest and coniferous forest preference. However, it is not clear whether being outdoors during childhood leads to a high preference for deciduous and coniferous forests or whether direct experience within those two types of landscapes is necessary for preference to develop. In other words, it is clear that environmental experience in general is important for preference development, but what specific experiences necessarily lead to a specific preference is not clear.

A few empirical studies have been completed with this point in mind. Dearden (1984) had subjects Q-sort photographs of urban, rural and wilderness settings and then had them complete a questionnaire about their background and experience. He found that a higher preference for natural scenes is expressed by those with more previous contact with

wilderness settings. Hendee, Catton, Marlow and Brockman (1968) surveyed wilderness users, looking for background factors that would explain their preference to spend leisure time in the back country. They found that 70% of the wilderness users had taken their first trip into the wilderness prior to 15 years of age. Although this is preliminary evidence that specific developmental experience can lead to specific preferences as an adult, the research is biased towards a sample of those adults who are spending leisure time in the wilderness areas and further study is needed which also includes subjects who had similar childhood background factors but choose as adults to spend their leisure time in urban areas.

Within the related field of art and aesthetic response development, it is clear that the aesthetic response does not develop spontaneously (Taunton, 1982). Cognitive developmental factors and learning situations, such as modeling of adult response, set the stage for the development of aesthetic responses. How do cognitive developmental factors affect aesthetic response to the environment? Limited evidence (Harrison and Sarre, 1971) suggests that the features of the environmental image that an individual uses in his/her mental representation of that environment are dependent upon the person's beliefs and emotions about those features. The features that are used in the mental representation of a particular environment change over time and vary with the actions performed in that environment. It is presumed that the aesthetic response varies with the emotional component of this process, and the cognitive stage of development influences the features that are abstracted from the environmental image. However, this is not clear since the study of mental representation of the natural environment is in its infancy, according to Knopf (1987).

Traditionally, the emphasis in the study of cognitive development has been upon body-object orientation (Piaget & Inhelder, 1967; Pick & Lockman, 1981) or wayfinding (Siegel & White, 1975) with less emphasis placed upon the functional significance of the environment to children of different ages. Hart (1978) points out that Piaget focused more upon children's conceptions of relations between objects rather than their knowledge of the

objects themselves and also paid little attention to affect in general. Inattention to this topic may be due to the underestimation of children's abilities to mentally represent the environment, due to their limited familiarity with the environment (Heft and Wohlwill, 1987).

Therefore, a tentative conclusion can be made that developmental experience within settings can affect adult preference for such settings and this process is not entirely spontaneous but is dependent upon learning situations and cognitive processes that develop with age.

### Age Group Differences in Preference

Since environmental preference studies typically have restricted their samples to young and middle age adults (Zube, Pitt, Evans, 1983), it is difficult to discuss the differences in preference that might exist between children and adults. We can expect that there would be differences in preference between adults and children, for a variety of reasons. First, a difference could be expected due to the lack of experience children have in many different types of environments, and particularly in wilderness environments. One of the reasons this is true is that because of their age, children have not had the opportunity to experience everything yet. Children also are limited by the size of their home range, which is dependent upon the limits set by the parent and upon the child's efforts to use more distant areas. Moore (1977) proposes that the home range is limited to the immediate area around the home until around the age of eight. Coates and Bussard (1974) found that during the ages of 6-9, the home base area increases tenfold and the path length (i.e., maximum distance traveled) increases five- to eightfold. Barker and Wright (1955) found in their observational study of children in a Midwestern town, that gradually throughout childhood the amount of time spent outdoors increases until a peak is reached in adolescence. This evidence supports the notion that early childhood experience is very different from later experience due to the limited home range and due to the difference in

amount of time spent in environments that are farther in distance from the immediate home area.

Second, we can expect differences in environmental preference between adults and children because children have a different perspective of the environment based upon their physical maturation level. Children are shorter in height than adults and as a consequence simply cannot view or reach certain features of the environment. In addition, they are less able to explore for long distances due to the lack of stamina and determination that an adult may have. But children are blessed with a small body size that can squeeze into caves and between buildings where adults could not proceed. Because of their body size and limited exploration range, it can be argued that children are more closely engaged, physically, with the environment than adults. Therefore, the child's experience is different based on the level of physical maturation.

Third, based on Piaget's research discussed previously, we can expect differences due to dissimilar levels of cognitive development. The qualitative and quantitative cognitive abilities of adults are different from those of a young child's such that expressed preferences will differ. For example, Zube et al. (1983) found that the two youngest age groups in their study (6-8 years and 9-11 years) had different preferences than all of the other age groups. They found that one difference between the younger age groups and the adults in the study, was that the younger subjects were not using the natural/human-built dichotomy to determine their preference. The adults through experience may have learned that it is easier to organize environmental experience into conceptual categories such as natural and human-built. Children may not learn to organize information about the environment in this way until a later stage of cognitive development. It is possible that the experimenters expected children to use the dichotomy in the same way as adults, an expectation that may be in error, as discussed previously. It is unclear as to what factors, if not a dichotomy, were then used by the children to determine preference. However, this is

one example of how cognitive processes may affect preference expression at different age levels.

A final reason we might expect preference expression to be different in children vs. adults, is the suggestion that aesthetic judgment is not fully developed until 11 or 12 years of age (Taunton, 1982). Prior to that age, children seem to make decisions about objects in an idiosyncratic way. Taunton suggests that preference is inconsistent during this time due to the changing relationship between object and child. By 11-12 years of age, children develop a more objective method of decision-making by looking at the features or qualities of the stimulus. But even at this age cognitive limitations can affect the evaluation of objects. For instance, at 11 or 12 the child is able to sort paintings by the artist, but cannot provide verbal reasons for the differentiation. Perhaps the use of the natural/human-built distinction develops in the same fashion, from a more idiosyncratic use, to a nonrational use, to the adult's rational use of common denominators. The development of preference decision-making abilities may accompany the development of the use of the natural/human-built dichotomy, although empirical evidence is lacking on this point.

There is some evidence to support the expectation that there are age group differences in preference for specific environments. Lyons (1983) presented slides of landscapes varying in amounts of vegetation to subjects ranging in age from 8 to 67 years of age, and asked for ratings of preference. She found that the preferences of the 8-year olds were more inconsistent on a within-subjects basis compared to the older age groups and that the younger subjects were much more enthusiastic in their preference expression (i.e., they used the extreme ends of the scale more frequently than older subjects). She found a general decrease in preference with age, with a significant drop in preference for all slides during adolescence. Therefore, preference was expressed differently by different age groups and the average preference for landscapes in general, differed also.

Balling and Falk (1982) obtained the preferences of subjects ranging from 8 to 70 years of age for a range of landscapes. They also found that landscape scenes in general are rated lower with age, the highest scores given by children and the lowest ratings given by adolescents. An additional difference found was that young children rate savanna environments higher compared to other types of habitats such as coniferous forests, a preference that other age groups did not exhibit.

Therefore based upon the limited evidence presented, it appears that there are age group differences in the expression of preference. These differences are presumably due to differences in home range, physical maturation, cognitive and aesthetic judgment skills. Further study of these differences is needed, and is an emphasis of the current research.

## Attitude Formation

An attitude is a relatively consistent cluster of feelings, beliefs, and behavior tendencies directed towards specific persons, groups, ideas or objects (Eagly and Himmelfarb, 1978; Oskamp, 1977). Attitudes are made up of at least three components--affect, cognition and behavior. The affective component is based on the likes or dislikes one has for persons, groups, ideas or objects. For example, in an attitude towards dogs, one may dislike dogs because of a fear of black, furry objects. The cognitive component of attitude is based on the beliefs that one has about objects, particularly assumptions about objects that are not located in the immediate situation (Elms, 1976). For example, one may have a negative attitude towards dogs due to a belief that dogs are dangerous and unpredictable. Finally, the behavioral component is based on the tendency to act in a certain way towards objects. Therefore, if one has a negative attitude towards dogs there will be a tendency to avoid interacting with them if at all possible.

It is generally hypothesized that the function of an attitude is to support an individual's ability to achieve a particular goal. This assumption that need satisfaction is the primary function of attitudes, is in part based on the observation that we are selective

and do not take up every attitude that comes our way (Halloran, 1967). Specifically, Katz (1960) suggests that attitudes serve to help us achieve goals such as obtaining rewards and avoiding punishment. For example, the negative attitude towards dogs allows the individual to avoid danger and gain the reward of living in a risk-free environment. Katz suggests that attitudes also function to defend the self image and to give structure to the surrounding world. Therefore, the white supremacist, through prejudicial attitudes, may be able to maintain a sense of self, gain a sense of personal power over the world and feel comfortable knowing that the human population can be organized according to race. Finally, an expressed attitude provides satisfaction when the attitude is congruent with the individual's self image. This satisfaction alone can be one of the primary reasons why many people maintain attitudes--there is great satisfaction in the sense that one is consistent in beliefs, affect and behavior towards the surrounding world. To conclude, attitudes are developed towards those features in experience which are associated with the satisfaction of needs, and features associated with structuring the experience of the self and of the world so that a sense of consistency is maintained.

Allport (1954) has proposed that the majority of attitudes form throughout development during interactions with family and friends, while some attitudes originate from the individual's direct or personal experience with an object, person or setting. Although interactions with peers, the school environment and the media are important in attitude formation, parents appear to the primary agents in the socialization process (Adorno, Frenkel-Brunswick, Levinson & Sanford, 1950; Jennings and Niemi, 1974). The role of parental attitude in the child's attitude formation process is the primary focus of this study; as a consequence other agents of socialization will not be emphasized in the present discussion.

The impact parents have on attitude formation is at least in part attributable to the strong emotional bond between parent and child, a bond which according to attitude theorists (e.g., Triandis, 1971) makes the parent an attractive, trustworthy and powerful

role model. Often the type of parenting style can influence the child and lead to the development of specific types of attitudes. For example, Adorno et al. (1950) found that those people who had aloof, stern and punitive fathers in families where strong hierarchical family lines were drawn, tend to develop an authoritarian personality. This personality is manifested in several ways including hostility towards those who violate social norms, superstition, destructive cynicism, preoccupation with power, and strong prejudicial and conventionalistic attitudes. Those people who were not raised in a punitive and highly disciplined atmosphere do not score highly on the Fascism Scale, the scale that measures authoritarianism. It is not clear whether the reason that children develop the authoritarian personality is that the behavior of the parent causes the child to act in a certain way, or whether the personality characteristics shown by the children are a form of imitation of their parents. In either case, the point here is that experiences in childhood with a particular type of parenting can lead to the formation of different kinds of attitudes. Other examples where the role of parents in children's attitude formation is particularly important, include prejudice (Epstein and Komorita, 1966), persistence of democratic attitudes (Beck, 1977), and political orientation (Jennings and Niemi, 1974).

Relative to other areas of attitude formation, the developmental factors involved in the creation of environmental attitudes have received little attention. Much of the research that investigates children's environmental attitudes is focused upon the development of conservation attitudes via the educational system. The development of responses towards objects and settings outside the limits of classroom curricula has not been emphasized in previous research. Despite the fact that political and environmental attitudes differ in some ways (e.g., environmental attitudes are founded more in perception during direct experience whereas political attitudes are founded more in abstract thought), the political attitude formation literature is useful as a guide.

Specifically, how do attitudes form? The development of an attitude and its components is primarily dependent upon learning, although the affective component of

attitude may in part be based upon inherited characteristics such as temperament. Several types of learning processes have been hypothesized to play a role in attitude formation, including classical and instrumental conditioning, and social learning. Classical conditioning is a type of learning where the individual comes to associate a neutral stimulus with a second, nonneutral stimulus that always elicits a particular response. One of the most famous examples of this type of learning is Watson and Raynor's (1920) experiment with little Albert and the white rat. Initially, Albert reacted positively to the rat by touching and playing with it. During the conditioning phase, a very loud noise was presented every time Albert reached for the rat. Since loud noises are fear-provoking to infants, Albert soon came to fear the rat. Therefore an initially innocuous stimulus became feared through conditioning with a non-neutral stimulus such as noise. The resultant fear became part of an attitude that Little Albert subsequently had towards white rats and white, furry objects in general. Staats (1975) proposes that many of our attitudes are learned in this same fashion. The "mere exposure" theory of Zajonc (1968, 1980) that was discussed in the Familiarity and Mere Exposure section, seems to follow a classical conditioning model of learning. For a child, the city park may initially be a neutral stimulus. But when the features of the park are consistently paired with the pleasure of play or solitude, the features of the landscape become associated with pleasure and the park is no longer a neutral stimulus. In this example, not only classical conditioning has occurred but also familiarity through mere exposure. The problem with the classical conditioning explanation of the learning process, is that it ignores social and motivational factors that can impact attitude development (e.g., children imitating other children who like to go to the park to play).

The instrumental learning model does incorporate the motivations of the individual by considering the importance of reward and punishment during learning. Instrumental conditioning is a form of learning where freely emitted acts become associated with the consequences they produce. For the park example, the child may find that whenever he/she goes to the park there are accompanying benefits such as less parental control, more

social interaction with peers, or more privacy. The pleasure obtained from these benefits is a reward for going to the park, and the child is drawn then in the future to that particular setting in order to obtain that reward. However, this learning model taken alone does not account for the influence social factors can have upon learning, particularly in situations where the child does not directly experience reward or punishment.

Social learning is a process in which new responses are learned by observing the behavior of others (models) and the resulting consequences of the behavior, mentally storing what was witnessed, and then imitating the observed actions in order to achieve similar consequences. The social learning model adds to the two previous models by explaining situations in which children learn and imitate adult behavior patterns without directly experiencing any previous reinforcement in that situation. The social learning model, then, emphasizes both the cognitive and social factors that play a role in learning, factors that influence learning when reinforcement is not available. Bandura (1977) argues that learning via observation is highly efficient since very complex behaviors can be passed on without much trial-and-error effort on the child's part. With regards to environmental attitude, this efficiency is particularly important. It would be very difficult for a child to learn everything about the environment via direct experience that is dependent upon reinforcement or pairing of stimuli. When a parent expresses very different beliefs, affect, and behavior in the kitchen at home vs. the city park or the beach, the child observes and imitates these expressions. The child learns that certain behaviors are appropriate only at home, that certain needs can be met only at the beach, and that experiences differ greatly between settings. This type of learning is very complex and the trial-and-error method would be very slow indeed.

All of these learning models are involved in the process of environmental attitude formation. The classical conditioning process ensures that landscape features are associated with experience such that the child can then use the features as cues to decide whether to approach or avoid a particular setting. The instrumental conditioning process

incorporates the individual's motivation to use those cues and the social learning process supports more complex learning where simple cues and personal motivation would not be enough. With regard to the development of environmental preference, the support of all three types of learning is important. Specifically, the child can form preferences by experiencing the association between his/her affect and the features of the environment, by associating the features within the setting with reward or punishment, and by observing others interact with the physical environment. With all three types of learning present, the probability increases that the child will learn the necessary ideas to function adaptively in their environment.

It is important to point out that learning does not occur in a vacuum, that there are constraints that influence the learning process. Genetic and maturational factors have direct effects upon development in general. What any individual is capable of learning at any point in time is dependent upon inherited factors and where the individual is within the life cycle. For example, temperamental factors that are inherited may influence affective response to the environment and ultimately the expression of environmental attitude. Garcia-Coll, Kagan, and Reznick (1984) have described the environmental response of the "cautious child", a child that is highly cautious of any environmental interaction, social or physical. The cautious child tends to be very shy in social interactions and tends to avoid manipulating environmental features during play. For example, cautious children unlike other children, would interact with a novel toy in a playroom only after much observation and cautious attempts to touch the toy. These researchers propose that there is a genetic basis for this cautiousness, that such behavior can be considered to be inherited as a temperamental factor.

Maturational factors too, are proposed to be extremely important for the expression of environmental attitude. As discussed previously, environmental experience is highly dependent upon the level of locomotor skill and the individual's current level of cognitive development. These maturational factors influence immediate environmental experience

and ultimately the development of environmental attitude. Therefore, genetic and maturational factors have an indirect influence upon attitude formation by limiting or channeling the learning process throughout development.

### Model of Environmental Attitude Development

Prior to the discussion of a developmental model, it is important to clarify three assumptions that support this model. First, the model needs a conceptual base regarding human-environment relations, as discussed by Overton and Reese (1977). The philosophy chosen here is that humans and the environment are interdependent systems, which means people can affect the environment and the environment can in turn shape the behavior of people. People affect the environment by acting upon it and reality is discovered through such action. The environment in turn influences people through the changes that occur in the environment from human interaction. These changes influence people because the constancy of the environment is discovered through the changes. In order to directly experience and understand the environment there must be a strong interdependence between humans and their environment.

Second, there is an assumption that active interaction with the environment is necessary for development to occur. Development does not occur in a vacuum, it is dependent upon the use of external environment features as well. This is the mainstay of Piaget's theory, discussed previously, in which the functional environment changes as the organismic structures (cognition, affect, morality, etc.) change across the lifespan. In other words, the function and value of specific environmental features change as the organism develops. As the function and value of environmental features change, the organism can then develop internal structures related to the use of those features. Therefore, active interaction with the external environment is as influential upon development, as the isolated maturation of organismic structures.

Finally, it is important to clarify that there is an assumption that the origin of preference is within the interaction between affective and cognitive processes. Affect leads the individual into a certain environment via approach-avoidance responses, and being in that environment leads to certain cognitive processes that lead to new cognitive and affective states that change or maintain future emotions and beliefs about the environment. Therefore, it is presumed that there is a complex interplay between cognition and affect that leads to the development of preference. This conclusion influences the proposed model.

The model followed in the current research is presented in Figure 1. It is an iterative model with no specific origin for the process. The individualistic variables listed on the right side of Figure 1 influence the development and expression of all components of attitude. A more thorough discussion of how each of the individualistic variables affects environmental attitude is included primarily in the Development of Environmental Preference and the Study Rationale sections, however, they will be described briefly here. With maturation comes change in physical, emotional and cognitive responses towards the environment. For example, as discussed previously, the maturation of locomotor skills allows the child to explore more of the environment which may support the formation and expansion of environmental attitude. Personality variables such as introversion/extraversion (Gray, 1972), self-monitoring (Snyder, 1979), and field independence/field dependence (Berry, 1977), can affect attitudes about the environment. Extraverts, low self-monitor and field independent individuals are more engaged in the environment and more aware of environmental cues. Demographic variables such as socioeconomic class (Duncan, 1973; Hecht, 1975), education (Cheek, 1972), race (Peterson, 1977), sex (Macia, 1979), etc. can impact the individual's attitude towards the environment.

Experiential factors are extremely important in the development of environmental attitude. Familiarity and experience in the environment, parental attitudes and cultural values about different environmental settings are all important factors that influence attitude and have been discussed in previous sections. Finally, genetic factors, such as

temperament, may exist that predispose an individual to respond to environmental features in such a way as to influence attitude formation.

The development of the three components of attitude--affect, cognition and behavior--is based upon relationships between the individualistic variables and upon the relationships between the three components themselves. The status of these relationships can impact the development of an environmental attitude in the immediate situation or over the life span.

The process of environmental attitude development can occur in several ways within this model. It is proposed that all of the individualistic variables are changing throughout the lifespan, causing affect, beliefs and behavior to change with time. Therefore, a child may have a certain environmental attitude at age 8, but the attitude may change by adulthood due to the changes in beliefs and emotions about the environment. The fact that children have minimal experience with the environment means that their beliefs and behavior will be undeveloped and inconsistent in expression. But as the complexity and influence of the individualistic variables increases, attitudes will form and each aspect of attitude expression will become more consistent with time.

As an adult, the expression of attitudes in behavior is more consistent than in childhood due to a stronger structure of affect, behavior, and beliefs, and due to the desire to maintain consistency between attitudes and behavior. But adults may not always appear to be more consistent than children in attitude expression for two reasons. First, with further environmental experience there are more beliefs and emotional associations available that were collected along the way, which makes preference decision-making much more complex. As preference becomes a more complex process, behavior that is dependent upon preference may vary across time for the same situation. This variation in preference and behavior is due to variation in the saliency of beliefs and affect from one moment to the next. Second, behavioral expression of attitude may not always reflect the individual's affective evaluation and beliefs. Upon influence from the individualistic variables,

behavior can be expressed that conflicts with emotions and beliefs. This conflict can lead to a change in the original affective and belief components so that consistency for all three components, is achieved once again.

The discussion of this model elucidates the complexity of the interactions between affect, beliefs, behavioral expression, the individualistic variables, and development. The current study examines specific interactions in the model. Three of the main variables, beliefs, affect and behavior were examined with regards to the attitudes towards natural or human-made features. All of the individualistic variables, except genetic factors, were examined with one or more of the three main variables. Although there is a strong emphasis upon the preference component of environmental attitudes, examination of all three components of attitude will further support any conclusions about the impact of individualistic variables upon environmental attitude formation.

## Study Rationale and Hypotheses

The study was a cross-sectional study concerned with age-related differences in environmental attitude, similarities in landscape preference within single family groups and the relevant factors that affect attitude formation. The questions asked in this study were the following: Does experience with environmental qualities as a child affect the development of environmental preference, choice of place to live, leisure time activity location, and the value of natural and built environments as expressed by the child or the adult?

In addressing the relationship between preference and other attitudinal variables, three general points were examined. One facet examined was the age-related differences in the expression of preference for environments, between children of 11 years of age and adults. The second facet was preference in childhood. The goal was to determine the degree to which preference is related to the child's direct experiences in the environment during leisure time and to attitudes expressed indirectly by parents such as place of

residence or choices made during family leisure time. The third facet examined was the relationship between adults' environmental preference and their own developmental experience with environments.

Although there appears to be an intergenerational process of transmission of political attitudes as discussed previously, there is no research completed to date upon the transmission of environmental attitudes. This study approached this problem by assessing the shared environmental attitudes within a family using attitudinal questionnaires and measurements of landscape preference. The attitudinal history of the adults was assessed as well. Although this procedure depends upon the retrospective reports of adult subjects, such measures were employed to identify those variables in childhood experience that may predict adult patterns of preferences and attitudes toward the environment, for future longitudinal study.

As discussed previously, it is important when measuring attitude to consider the affective, cognitive and behavioral components jointly, in order to increase the accuracy of prediction between attitude and behavior. In the current study, the affective component of environmental attitude was measured by preference for landscapes, the cognitive component was measured by obtaining environmental values and by preference for landscapes, and the behavioral component was measured by obtaining information regarding where subjects live and spend their leisure time. The following is a summarized explanation of attitudinal variables that were utilized in this study:

Affective Component--As discussed in a previous section, it is assumed that preference is dependent upon both affective and cognitive processes. Preference, and in particular the affective portion of preference, is the emphasis in the current research because the environmental attitude literature has traditionally emphasized preference as well. Also the affective portion of environmental attitude and of preference itself, is particularly interesting to study due to the "primitive quality" of the evaluative response compared to beliefs or behavioral responses. This primitive quality is exemplified by Zajonc's (1980)

note that the affective reaction is involuntary, immediate, and nonverbal. It is a response that may occur prior to cognition and/or behavior in some cases.

Landscape preference in part, then, represents the affective component of environmental attitude. One way to measure preference is by presenting videotaped scenes of several types of landscapes and requesting that subjects rate each of the scenes on a 7-point scale ranging from like to dislike. The ratings can be averaged for each type of scene--natural (little or no apparent human influence), built (frequent apparent human influence) or intermediate (scenes with some apparent human influence)--and these average scores represent the individual's affect for each of those scene types. The scenes chosen for this study represented the full range of the natural to built environment continuum. Ten scenes represented the natural end of the continuum, depicting various natural landscapes such as desert, forest, and ocean views with no apparent human influence. Ten scenes represented the human-built end of the continuum, depicting urban areas, buildings, freeways, with much apparent human influence but avoiding scenes blighted by pollution or other negative qualities. Ten scenes represented the intermediate or middle section of the continuum where natural features are integrated with some human influence such as farm lands, recreation areas, and backyards. Thirty undergraduates from a UC Davis psychology course were asked to judge which category the 30 scenes should be placed into as a reliable indication of appropriate categorization of scenes for the main study. Only scenes that elicited high levels of agreement were included in the study.

In filming the scenes every attempt was made to control for distance to focal point, season, time of day, and angle of view. All of these variables can bias evaluative judgment, the significance of which is discussed by Buhyoff and Wellman (1979) and Shuttleworth (1980). Different types of scenes as suggested by Litton (1972), were included to increase variety in the video sample, such as panoramic (e.g., wide angle shot of a valley), feature (e.g., redwood trees), focal (e.g., waterfall in central part of scene), enclosed (e.g., cave area), and canopied (e.g., trees covering road) landscapes. None of

the scenes included any recognizable features that may influence preference, such as animals (Coss & Towers, 1990), people, or local features such as the Golden Gate Bridge.

It is important that the scenes be presented on videotape, where the sights and sounds of the scenes are displayed. Video tapes are preferable to slides due to the significant informational value of sounds and dynamic displays as mentioned by Wohlwill (1976). With the presentation of a slide, the experimenter is removing much of the information about the original scene since a slide is lacking the acoustical and dynamic (e.g., motion) qualities of the scene. It is possible that previous efforts to assess preference have been influenced by the limitations of presenting only the visual information from the original scene. It is logical that attempts should be made to present as much information about the original scene as is feasible, in order to assess preference for environments. There is an additional proposed benefit to using video displays which is that children may show more interest in tests that involve videos rather than slides. Tuan (1978) has argued that landscape slide displays are too static to be interesting to children. Appreciating the mood of a landscape is a skill that is cultivated thoughout adolescence into adulthood. Therefore, it was hoped that the videos would better capture the attention of the younger subjects, preventing early fatigue during testing.

Cognitive Component--The cognitive component of environmental attitude is represented by the landscape preferences discussed above, but also is represented by beliefs and values towards the environment. The Environmental Response Inventory (ERI) developed by McKechnie (1974) has been used to assess differences in the way individuals interact with the environment based on environmental beliefs and values. These individual differences in environmental interaction, beliefs and values, are grouped together to form an environmental disposition. The environmental disposition is a hypothetical construct that summarizes a person and their behavior patterns into several if-then statements (Craik, 1976). For example, if Jane experiences the smell of a pine tree, then she will visually search for the pine tree, sit underneath the tree, avoid her responsibilities and enjoy herself.

The ERI is based on eight different dimensions [see Table 1, which lists the ERI dimensions as described by Bunting and Cousins (1985)]. The dimensions are Pastoralism, Urbanism, Environmental Adaptation, Stimulus Seeking, Environmental Trust, Antiquarianism, Need for Privacy, and Mechanical Orientation. Based upon the results of factor and correlational analysis, these dimensions were found to be the best summary of individual responses to the physical environment. To exemplify the predictive value of the inventory, several researchers have successfully used the ERI to discriminate and predict residence choice (Kegel-Flom, 1976), recreational dispositions (Driver and Knopf, 1977; McKechnie, 1974; Phillips, 1978), design preferences (Gifford, 1981) and migration rates (Kegel-Flom, 1976). Based upon this existing literature the assumption was made in the present study that environmental disposition as measured by the ERI, is a useful summary of environmental beliefs and values which can predict behavioral expression of environmental attitude.

The Children's Environmental Disposition Inventory (CERI) developed by Bunting and Cousins (1985), is the children's version of the ERI. The inventory has been used with children ages 9 to 16 years and produces the same dimensions as the ERI, allowing for a comparison between parental environmental disposition and offspring environmental disposition. Bunting and Cousins performed a test-retest sequence comparing the CERI and the ERI scores of 17 year old adolescents. They found the range of correlations had a median of .79, with all of the correlations being significant at the .05 level or better. Therefore the comparison between the ERI and the CERI is relatively safe, despite the difference in the actual wording of the items.

Behavioral Component--As discussed previously, the residence of the subject has a great impact upon environmental preference and attitude, and the choice of residence is often a behavioral expression reflecting environmental attitude. It is clear that residence choice is also strongly affected by occupation, income, education, mobility, etc. However, it is proposed that attitude towards the environment is interrelated with occupation, income,

education, and mobility and therefore environmental attitude can be indirectly expressed by residence choice. For example, if a man values living close to wilderness and yet being close to work so that less of the atmosphere is destroyed by his car's exhaust, then he may choose to take a job in a rural town for less income. In this case it is more obvious that environmental attitude is affecting choice of occupation and residence. Another man may have the same environmental values but choose a higher income in the city. His residence choice may still reflect his values in that he chooses an apartment building that has a considerable amount of landscaping surrounding it and it is located on the edge of town, as close to rural areas as is possible. In this case, the relationship between environmental attitude and residence is harder to observe, but the relationship is still there nonetheless.

The behavioral expression of environmental attitude can also be measured by surveying the amount of time each individual spends in natural and built settings during leisure time activities and the expressed familiarity with those settings. Some researchers have found a relationship between spending time outdoors and preference for such environments (Balling and Falk, 1982; Dearden, 1984; Lyons, 1983). For example, Dearden (1984) found a positive correlation between time spent recreating in wilderness and preferences for wilderness scenes. He also found that subjects ranked recreation activities, past landscape experience, and travel as highly important factors in their expression of landscape preference. Therefore, subjects themselves feel that where they spend their time greatly influences their environmental attitudes.

But does environmental attitude in turn affect the locations used during leisure time activities? Knopp (1972) found that psychological needs affect the type of environment sought during leisure. He asked urban and rural residents to explain why they spend their leisure time in outdoor settings. He found that urban residents and those in occupations with high levels of social contact seek outdoor environments to gain solitude. Rural residents often sought social interaction in the outdoor environment presumably because of their workday social isolation. The environments that offer solitude and social interaction

often differ so that the two groups of individuals will seek different environments during leisure, due to different needs. It appears then that psychological need can impact the choice of environment for leisure time activities. Psychological needs from the environment such as exercise, rest, freedom, prestige, etc. reflect the individual's general environmental attitudes, beliefs and values. Knopp's study provides support, then, for the notion that environmental attitude affects the locations sought during leisure time.

Environmental attitudes appear to affect locations chosen during leisure time and conversely locations chosen during leisure time affect environmental attitudes. Therefore in the current research, the locations of leisure time activities were assessed because it appears that locations chosen are behavioral expressions of environmental attitude.

Finally, levels of familiarity with different types of environments are very much influenced by activity locations and by residence. Therefore, familiarity with natural and urban environments was also assessed and was considered to be an indirect measure of behavioral expression towards the environment.

### Hypotheses

The emphasis in the study is upon preference and the development of preference for both adult and child subjects. Therefore the hypotheses are organized around the relationship between environmental preference and other environmental attitude measures during the subject's past and present.

Hypothesis 1. Landscape preference is related to current residence type, locations of leisure activities, familiarity with different environments, and environmental values. This relationship is expected to exist for both adult and child subjects when considering their current life period. It is also expected that the adult preference levels will be related to childhood residence, activity locations, familiarity levels and environmental values.

GENERAL ATTITUDINAL MEASURES--It is expected that many of the attitudinal measures should vary along with preference such that preference, values,

behavior and residence cluster together into a larger whole--the expression of an environmental attitude. Correlational analyses will be used to explore the relationship between preference and these other variables. It is expected, for example, that an adult who prefers natural landscape scenes and has a low preference for built scenes will spend a large amount of time outdoors, choose to recreate in wilderness areas, fight for environmental preservation, and choose to live in a rural setting. This exemplifies the clustering of attitude measures together such that behavior, beliefs and emotions are consistent. It is also expected that children's attitude measures should vary along with their parents' measures. For example, it is predicted that the adult who was described as having a high preference for natural landscape scenes, has a low preference for built scenes, who spends a large amount of time outdoors, chooses to recreate in wilderness areas, fights for environmental preservation, and chooses to live in a rural setting will raise a child with very similar attitude expressions. Such results would support the idea of intergenerational transmission of environmental attitude.

If current experience and childhood experience for the following variables--residence, leisure activity location, levels of familiarity with different environments, and environmental disposition--are related to scene preference, then the average preference scores should be predictable based upon knowledge of those background variables. Palmer and Zube (1976) found that subjects make judgments about landscapes based upon a continuum, ranging from purely natural landscapes to purely human-made. Herzog, Kaplan and Kaplan (1982) found the same continuum is used in urban settings, ranging from those settings with some natural features to those with no apparent natural features. Therefore, there is evidence to support the hypothesis that there is a continuum being used by subjects when labeling any type of environment. Neither of these studies have considered residence or age variables with regards to the use or non-use of a continuum. The current study does so.

If the preference rating of landscapes is related to current residence, current leisure activity locations and environmental dispositional characteristics, then this would support the conclusion that adult preference has a relationship to current environmental behavior, beliefs and emotions. For example, it is predicted that those who show a high rating for natural settings and low ratings for built settings will choose to live in a rural setting, spend much of their leisure time outdoors and have a high score for the dimension of pastoral and a low score for the dimension of urbanism. The proposed relationship between these variables is based on findings in previous research on the ERI. The inventory scores which reflect current environmental beliefs and values have successfully predicted residence choice (Kegel-Flom, 1976), recreational dispositions (McKechnie, 1974; Phillips, 1978), design preferences (Gifford, 1981) and migration rates or rates of moving from one area to another (Kegel-Flom, 1976). In the current study, residence choice, environmental beliefs and values, and leisure time location were considered simultaneously in search of those variables that best predict environmental preference.

If the preference rating of landscapes is related to childhood residence and childhood leisure activity locations, then this result would support the conclusion that adult preference is affected by childhood environmental experience. For example, it is predicted that those who show a high rating for natural settings and low ratings for built settings grew up in rural settings and spent much of their leisure time in natural settings. This hypothesis is supported by Zube et al. (1974) who found that landscape exposure as a child explains some of the variation in adult preference. Lyons (1983) and Balling and Falk (1982) both found that childhood experience outdoors is associated with high preference ratings for natural settings. It is not clear whether the same relationship with childhood experience is true for those who currently prefer built settings and grew up in urban environments.

If a child's preference ratings are related to their own current residence, leisure time activity locations, familiarity levels and environmental dispositional characteristics, then

this result would support the idea that preference is related to environmental experience and environmental beliefs. For example, it is predicted that children who rate natural scenes high and built scenes low will live in rural environments, spend the majority of leisure time in outdoor activities, and have a high score for the dimension of pastoralism and a low score for the dimension of urbanism. The literature on adult preference is relevant to this hypothesis, such as the work of Balling and Falk (1982), and Lyons (1983) where residence, preference, and recreational activities are related. However, neither of these studies considered adult-child similarities and differences in preference in relation to residence, recreational activity locations and environmental affect and beliefs. It is predicted here that such variables are related due to the expected consistency in attitude expression in behavior, cognition and affect.

RESIDENCE--Considering preference in a more specific manner, it is expected that subjects will have higher preference ratings for certain environment types than for other environment types. If natural landscapes are rated higher than intermediate or built landscapes by all adult subjects across all residence categories, then this result would support the findings discussed previously (e.g., Couglin and Goldstein, 1970; Herzog, Kaplan, Kaplan, 1982; Kaplan, 1978; Nassauer, 1979; Wohlwill, 1976; Zube, 1976) that natural scenery is preferred over built settings by the majority of subjects. The fact that there is little competing evidence on this point, may indicate that preference for natural settings is innate or is readily learned early in development. It was expected then that this pattern of preference would be true for all subjects despite residence differences.

If adults who currently reside in rural areas rate built scenes lower in preference than those adults who currently reside in urban areas, then this result would support the idea that current residence is related to landscape preference. Previous findings support this hypothesis including studies by Zube, Pitt and Anderson (1974) and Daniel and Boster (1976), who found that environmental preference is related to place of residence. Lyons (1983) found that subjects have a high preference for slides that are similiar to the biome in

which they currently live. However, Lyons did not control for childhood residence in her sample. Therefore, it is difficult to separate the impact of current residence from childhood residence. In the current study, both types of residence experience were considered.

If adults who had a rural childhood residence show a lower preference rating for built settings than those adults who had an urban childhood residence, then this result would support the conclusion that childhood residence is related to adult landscape preference. If adults who had an urban childhood residence show a higher rating for built settings than those adults who had a rural childhood residence, then this would also support the conclusion that childhood residence is related to adult landscape preference. This hypothesis is supported by Zube et al. (1974) who found that landscape exposure as a child explains some of the variation in adult preference.

In terms of children's differential preference for built and natural environments, both Balling and Falk (1982) and Lyons (1983) found that ratings for natural scenes is highest at age 8 and levels off during adulthood. Future research needs to assess preference for natural scenes prior to age 8. If the same trend continues back into infancy, natural landscape preference may be considered to be innate, particularly if the same result is shown across cultural groups. In the current study, the trend from 11-year olds to adults is expected to follow that of the previous research, for natural environments only.

If the children from rural residences rate preference for built settings lower than the children from urban residences then this result would support the conclusion that childhood environmental experience affects the development of preference for built settings. This point has been supported for natural landscape preference for adults (Balling and Falk, 1982; Lyons, 1983; Zube et al., 1974) but has not been reported for built environments for children or adults. If the rating for built scenes increases with age, starting at a low level for the 11 year-olds, then this result would support the conclusion that preferences for built scenes are learned throughout childhood. There is no previous research related to this topic in the current literature. This prediction is based upon the suggestion of those who believe

that we prefer landscapes of our evolutionary origin (Appleton, 1975; Driver and Greene, 1977; Kaplan, 1987; Rabinowitz & Coughlin, 1970; Ulrich, 1973, 1977). Since our evolutionary origin was deeply rooted in the natural savanna habitat until the last 130,000 years, preferences for the natural environment may be based on innate predisposition and require very little learning during development. The built environment with its special characteristics is new to the scene of human evolution and built structures have not had direct ecological significance in the history of their use. Therefore attitude formation towards built environments may require more learning during development. A delay in the expression of high preference for built environments until adolescence may indicate that experiential factors are involved in such a preference. T-tests should reveal that the 11-year old age group has a significantly higher preference for natural scenes than the adults, and a significantly lower preference for built scenes than the adults.

FAMILIARITY--If the subject's preference ratings are related to the types of environments that they have experienced, then this result would support the conclusion that preference is related to specific environmental experience. There is support in the research literature for the idea that familiar environments are preferred (Hammitt, 1979; Lyons, 1983; Sonnenfeld, 1967). Other researchers have not found evidence of this relationship (Balling and Falk, 1982; Kaplan et al., 1972; Seung-Bin Im, 1984; Wellman and Buhyoff, 1980). The conflicting evidence can be blamed in large part upon methodological differences between the studies, as discussed in a previous section. If adults rate those environments that they have experienced, either in childhood or adulthood, with a high score and give a low score for unfamiliar environments then the result would support the idea that preference and familiarity are related. Also, it is predicted that preference for natural environments is not related to experience, whereas preference for built settings is highly related to experience and familiarity with those settings.

If the child's preference ratings are related to the types of environments that they have experienced (according to parental report), then this result would support the

conclusion that preference is related to specific environmental experience in childhood. If children rate those environments that they have experienced previously with a high score and give a low score for unfamiliar environments then the result would support the idea that preference and familiarity are related. Also, it is predicted that preference for natural environments is not related to experience, whereas preference for built settings is highly related to experience and familiarity with those settings.

Hypothesis 2. Children's landscape preference is related to parental preference, residence, activity locations during leisure time, familiarity with different environments, and environmental values. If the ratings for landscapes are similar for parents and their offspring, then this result would be consistent with the hypothesis that there is intrafamilial transmission of environmental preference. For example, it is predicted that parents who show a high rating for natural scenes and a low rating for built scenes will have children with similar ratings. There is no previous research on environmental attitudes that is relevant to this particular hypothesis; however, some support comes from the political socialization literature. For example, it has been found that parents and offspring are similiar in their prejudices (Epstein & Komorita, 1966) and personality characteristics such as authoritarianism (Adorno et al., 1950). Allport (1954) has stated that the majority of attitudes held are influenced during development by family and friends. Unfortunately little evidence is available concerning the influence of family upon environmental attitudes.

If the child's preference ratings are related to their parent's leisure time activity locations, familiarity levels and environmental dispositional characteristics, then this result would support the idea that preference is related to family environmental experience and environmental beliefs. For example, it is predicted that children who rate natural scenes high and built scenes low will have parents who live in rural environments, spend the majority of leisure time in outdoor activities, and have a high score for the dimension of pastoralism and a low score for the dimension of urbanism. The literature on adult

preference is relevant to this hypothesis, such as the work of Balling and Falk (1982), and Lyons (1983) where residence, preference, and recreational activities are related. However, neither of these studies considered parent-child similarities and differences in preference in relation to residence, recreational activity locations and environmental affect and beliefs. It is predicted here that such variables are related due to the expected consistency in attitude expression in behavior, cognition and affect. The current parental attitudes will mediate their own past experiences, therefore the influence of parental background is not isolated from current attitudes in affecting the attitudes of offspring.

## Methods

### Subjects

Subjects included 32 families, matched for income and intactness (both parents living in the home), who were recruited through the elementary schools from two different areas. Within each family both parents and one 11 year-old child were tested. Seventeen of the families came from rural areas surrounding the Sacramento, California area and fifteen families were sampled from the urban area of Sacramento, California. Table 2 includes the current and developmental residence categories for each of the families in the study. The different residential experiences in the rural and urban areas were expected to produce differences in environmental attitude. Within the urban and rural groups, half of the subjects were male and half were female since the sex of the subject may be relevant to preference (Lyons, 1983).

Within the urban and rural family groups, half of the sampled parental pairs had an urban childhood background and half had a rural childhood background. The different childhood environmental experiences were expected to produce differences in the transmission of environmental attitudes from parent to child.

Subjects were drawn from urban and rural areas because it is expected that residence affects environmental attitude. Dearden (1984) found a high correlation between

housing density level during adult life and evaluations of wilderness and rural scenes. Those who lived in low density environments tended to prefer those landscapes that were more natural. When subjects were asked to rank the factors that they believed were influencing their landscape preference, subjects ranked present living environment highly. Urban and rural residence categories were used because they represent opposite poles on the continuum of natural to built environments. According to the U.S. Department of Commerce Bureau of the Census (1982), urban areas consist of a population concentration of at least 50,000 inhabitants. These areas consist of a central city and closely settled contiguous territories (suburbs), which have a density of 1000 people per square mile. Rural areas are those areas outside of urban areas and have less than 2500 inhabitants. These definitions of rural and urban area categories have remained consistent since 1950. Current residence of all subjects and the childhood residence of the adults in the study were placed into one of four population categories--0 to 5,000, 5000 to 25,000, 25,000 to 100,000, and >100,000. When these categories were organized into rural vs. urban categories, the urban category was represented by populations of >25,000 and the rural category by populations of <25,000.

Each of the children in the study was 11 years of age. This age group was chosen to represent the pre-adolescent attitude towards the environment. The 11-year olds were expected to have less experience with a variety of environments due to limited home range boundaries compared to adults, while such experience gradually increases into adolescence (Stea, 1970). It has been proposed that the amount of environmental experience is a significant factor in the decision-making process involved in preference. For example, the child's ability to classify the environment into categories such as outdoors vs. indoors, water vs. land, etc. improves dramatically after age seven or eight (White, 1965). It is possible that this improvement occurs primarily because the child becomes better able to sort complex stimuli (Moore, 1976). The ability to organize environmental experience is helpful in making preferential decisions, and this is certainly dependent upon cognitive

developmental factors. However, direct experience with the specific categories such as outdoors and indoors, water and land, is also important for developing this ability. Therefore, the 11-year old, by virtue of being older and more experienced with a variety of environments, is able to make different evaluations of the environment than the 7-year old, but not as well as the average adult.

As discussed in a previous section, the individual's level of cognitive development also has a great impact upon the experience of the environment. With this in mind, these age groups--11 year olds and adults-- were chosen to represent very different stages of cognitive development. Older adolescents were not considered due to inconsistencies in their use of rating scales as documented in other studies (Balling and Falk, 1982; Lyons, 1983).

It was assumed that the age of the parent was not a significant variable to control. Both parents were tested in order to assess the similarities in preference between the child and each parent.

## Sampling

The sampling sites were chosen based on their shared proximity to wilderness areas for leisure time activities. Since distance to recreational areas is often a limiting factor for use by families, it has been suggested that such an effect can be reduced in urban-rural comparisons by choosing sites sharing similar recreational areas in close proximity (Knopp, 1972). Both the Sacramento center and the surrounding foothill towns share the same nearby wilderness areas, allowing for equal opportunity for outdoor wilderness activities, at least with regard to distance limitations.

The subjects were obtained by contacting and obtaining consent of private and public school principals in the Sacramento and surrounding rural regions. Letters were sent to parents explaining the study on a general level and inviting them to participate. Return questionnaires were enclosed for parents to indicate their interest, and those with

affirmative responses were contacted by phone. The initial questionnaires included demographic information that allowed for careful matching of income across families and allowed for subject selection based on current residence and parental residence during childhood.

## Procedure

### Adult Participants

For each adult participant, the procedure began with a viewing of thirty videotaped scenes, discussed in a previous section, in order to assess environmental preference. The subjects viewed videotaped scenes presented on a television system and each subject sat approximately 5 to 7 feet from the television screen during the viewing of the videos. Each scene was presented to the subject for 15 seconds followed by a 10 second break where the subject was asked to rate how much he/she liked the scene on a 7 point Likert-type scale. Then the next scene was automatically presented for 15 seconds until the next break. This required a total of 15 minutes of viewing time for each subject. The three types of scenes (natural, intermediate and built) were presented in a random order to reduce order effects.

Following presentation of the 30 scenes, each adult filled out a questionnaire (see Appendix 1) that requested information regarding his/her own childhood residence, childhood leisure time activities, locations used for leisure time activities, and level of familiarity in childhood with different types of landscapes (landscapes similar to the video scenes presented). Current residence, leisure time activities, location of leisure time activities, and current familiarity with different types of landscapes were also assessed. Each set of parents was asked to identify the parent who was most aware of the child's environmental experience on a daily basis. The parent considered to be most aware of the child's experience was requested to fill out the section of the questionnaire devoted to the child's residence, leisure time activities, and level of familiarity with different landscapes

from birth to age 11. Each adult then filled out the 184-item Environmental Response Inventory (ERI) developed by McKechnie (1974).

Child Participants

The children were asked to rate the same 30 video scenes viewed by the adults, using a 7 point Likert-type scale, developed by Ellis (1968), that uses "Smiley" faces for subjects too young to read. A trial run occurred with photos of natural and built landscapes to ensure that the children understood the procedure. Each child was asked to rate the landscapes on the 7-point scale and then the experimenter asked the child if their number on the scale reflected the strength of their feelings toward the photo. For instance, a child might be asked "How do you feel about this picture?" or "So when you used a 5 for this picture, did you mean to tell me that you like this picture somewhat but not a whole bunch?". The discussions during the trial run lacked any comments concerning the "correct answer" or any value judgments from the experimenter. It appeared that all of the children understood how to use the scale since each subject's verbal response to the photo was similar in strength to the number chosen on the scale.

The timing of the video presentation was similar to the adult procedure. Children viewed the scenes separately from their parents to reduce any verbal evaluations or non-verbal feedback from each other that could have influenced the responses of either the children or the parents.

The children then completed the Children's Environmental Disposition Inventory (CERI) developed by Bunting and Cousins (1985), which is the children's version of the ERI. The children also provided information about the types of environments that they usually encounter during leisure time activities by indicating how many hours per week they spend in five different activities and the type of environment in which those activities occur.

## Measures

The following measures were employed in the analyses to identify those variables in childhood experience that predict adult preferences and attitudes toward the environment:

1. Preference--Each subject viewed 30 videotaped scenes and indicated preference for each scene on a 7-point scale ranging from Dislike very much (1) to Like very much (7). The 30 preference scores were grouped into the three categories of Natural, Intermediate and Built environment types, which have been described previously. Three average scores were obtained, one for each category of environment type.

2. Residence--Within the background questionnaire were questions regarding current and childhood residence type. This information was organized and utilized in analysis in the following ways:

Population Categories--Each adult subject provided the population size of the residence during four different life periods--Birth to 10 years, 10 to 15 years, 15-20 years, 20-25 years, and current residence. These life periods were chosen based on pilot testing, where each group was found to be slightly different in terms of experience and in relation to adult preference. For each life period, subjects indicated whether the population size of their resident community was 0 to 5,000; 5,000 to 25,000; 25,000 to 100,000, or 100,000 and above. One parent provided the same information for the child subject for the life period categories of birth to 5, and 5 to 11 years of age.

Population Mean--In some analyses the above population categories were organized into average scores and relabeled as rural (<25,000) or urban (>25,000).

Description--This residence measure was based on a verbal description by each adult subject of the residence area and was recoded as a numerical score ranging from 1 (Natural) to 7 (Urban). These scores were then reduced into three categories similar to the natural, intermediate and built preference types.

3. Behavior--Information was requested concerning the level of familiarity for types of environments and how much leisure time was spent in different environments.

General Familiarity--Adult subjects were asked to rate how familiar they were with natural, intermediate and built environments in general. The scale was based on 7 points ranging from Not at all Familiar (1) to Very Familiar (7). One parent provided the same information for the child subject. This measure was not utilized in most analyses because the Specific Familiarity measure appeared to be a more reliable measure since it was based on more data points. The analyses that do include General Familiarity are found in the Residence and Familiarity portion of the Results section.

Specific Familiarity--The same 7-point scale was used to collect information concerning familiarity for specific environment types that matched those shown in the videotapes (e.g., desert scenes). Familiarity scores for twenty-six scene types were reduced into three average scores representing the three environmental groupings--natural, intermediate, and built. Again one parent provided the same information for the child.

Activity Location--This measure involved the type of environment used during leisure time. Each subject indicated five typical recreational activities and then they rated the environment type where the activity occurs on a 7-point scale ranging from 1(natural) to 7 (built). The scores for each type of environment were weighted by the amount of time per week the subject is involved in each activity. These scores were then reduced to a mean score where the higher the mean score the more often the subject was active in built environments and a low mean indicated frequent use of natural environments. Activity location information for the child was requested from one parent and from the child. However the information from the child appeared to be unreliable during testing since many children described activities that they are currently involved in and ignored activities during other seasons or other life periods.

Outdoors/Indoors--This measure involves the percentage of time each subject spends in indoor and outdoor environments during the weekday and during weekend/vacation time. One parent indicated this information for the child.

4. Values--Each subject completed the ERI or the CERI which indicates several dimensions of environmental values and beliefs. Only the two dimensions listed below were considered directly relevant to this study given its focus on natural vs. built environments. The scores for each dimension can range from 0 to 100 and the inventory has a built-in subject reliability scale.

Pastoralism--This dimension is concerned with values for natural processes and natural objects. To clarify this dimension, two example statements are provided: "I feel a great attraction to the sea" and "Today, people are too isolated from the forces of nature".

Urbanism--This dimension is concerned with values for cultural expression and built objects. Two example statements are provided: "Small-town life is too boring for me" and "I would enjoy riding in a crowded subway".

5. Parental Scores--Each parent's scores were compared to his or her child's scores in two different ways.

Separate Parental Scores--Each parent's scores, the mother and the father, was compared separately to the child's scores.

Combined Parental Scores--A score for each couple was derived from the separate parental scores and the resulting mean score was compared to the child's scores.

# Results

## Descriptive Analyses

The sample included 32 intact families with 17 male children and 15 female children. Only families with incomes between $30,000 and $75,000 were selected for the study, therefore this sample represents a range of middle-class income families.

The following descriptive statistics are presented in order to clarify the environmental background of the entire sample, adult and child subjects, and some important comparisons such as sex and age differences. Figures 2-7 include the data and analyses discussed below.

**Residence**--Subjects were chosen based on the actual population size of their current residence such that 17 of the families were from rural settings and 15 were from urban areas. However, information was requested from each adult subject concerning their own definition of their childhood and adulthood residence type. The following descriptive statistics are concerned with self-definitions of residence, not any absolute measure of residence type, (e.g., census measures of population size). Considering all of the measures combined, it appears that the sample was balanced between rural and urban populations. Two different measures were taken for the current residence of the family, Population Size and Description of the subject's residence area. When parents described their own current residence, the Description and Population Size scores indicated that more of the families considered themselves to be urban, 20 compared to 12 rural families. These estimates by the adult subjects are different than the actual statistics for population size surrounding their residence. Therefore, despite the population estimates of the subjects, the sample is balanced for residence since half of the sample was drawn from an urban population and half from a rural population (see Table 2).

Of interest here is the fact that adult subjects are not very good at estimating the population size of their own residence and their estimates seem easily influenced by the wording of the question. For example, parents appear to describe their own residence differently than their child's. When parents were asked to describe their child's current residence, both residence measures--population size and the descriptor-- indicated that 16 of the families were rural (0-25,000) and 16 of the families were urban (over 25,000), a well balanced sample. However, parents describe their own habitat as more urban ($M$ = 4.18 $\pm$ 1.73) than their child's ($M$= 3.23 $\pm$ 1.52). This difference was statistically significant [$t$(89) = -2.60, $p$<.01]. Therefore, it appears that adult subjects population size estimates and responses to questions about residence are influenced by the composition of the survey questions. In this case, the estimates differed depending on whose residence the question is focused upon--child or parent. It appears that most parents in the study preferred to think that their child is residing in a more natural area during development, whereas, for themselves it was preferable to think that their own residence is in an urban setting with the accompanying opportunities for employment and cultural events. This conclusion is tentative since the adult subjects were not directly questioned regarding these biases. It is clear that questions regarding residence must be structured carefully to minimize such biases in future studies.

**Childhood Residence**--Combining both male and female adults the Descriptor measure indicated a good balance between rural and urban childhood residences with 33 subjects having had rural childhoods and 29 having had urban childhoods ($M$=3.48 $\pm$ 1.32). The mean residence description of 3.48 is the suburban landscaped residence type, which is considered to be the cutoff measure between rural and urban residence types. Throughout the four life periods residence, based on population size, shifts from rural to urban. As shown in Figure 2, the sample changed from 33-rural and 31-urban during the period of birth to 10 years of age, to 16-rural and 47-urban during the 20 to 25 year category (although most of the urban group from this life period was located in the mid-

range population size of 25,000 to 100,000 instead of the extreme population size of over 100,000). This shift is not that surprising, since almost all towns of any type in the U.S., have increased in population since approximately 30 years ago when the adult subjects were born. Despite this shift the sample as a whole appears to be well balanced for residence type during most of childhood. This was indicated by the mean for the combined life periods being approximately 25,000 ($M$=2.63), which is the cutoff population between rural and urban. Finally, the correlation between the Population Mean of the four childhood life periods for each individual and the Description score for each individual's childhood environment indicates that the two measures are similar ($r$=.49, $p$<.01), although not identical. Population Size during the four Life Periods was dropped from further analyses because none of the life periods were found to have any significant relationship to preference on an individual basis. Population Mean and Population Description measures were used for residence measures in the remaining analyses for childhood experience of the adult subjects.

**Recreational Behavior**--Information was requested regarding the percentage of time each subject spent in indoor and outdoor activities on a daily basis and during weekend/vacation time. To simplify reporting of the results, only the percentage of outdoor time and accompanying standard deviation will be presented and the amount of indoor time will be implied. As shown in Figure 3, the adults as children spent 50% ± 21.43 of their time outdoors on a daily basis and 73% ± 18.73 of their time outdoors on the weekends. As adults they spend 41% ± 24.37 of their daily time outdoors and 66% ± 19.04 of their weekend time outdoors. The child subjects spend 41% ± 17.07 of their weekdays outdoors and 65% ± 19.58 of their weekends outdoors. The correlation between children's outdoor experience and the mean of both parents' outdoor experience (combined parent scores) is $r$=.46, $p$<.01 for daily experience and $r$=.78, $p$<.01 for weekend experience. Therefore the sample appears to be outdoors much of the weekend time and there is similar use of the outdoors within families on a daily and weekend basis.

For adults, however, the amount of daily and weekend outdoors experience has decreased somewhat across the lifespan.

The scores for Activity Location, as shown in Figure 4, indicate that throughout childhood and adulthood, the activities of the adult subjects were slightly biased toward built environments ( M= 4.83 ± 1.45 in childhood and 4.93 ± 1.37 during adulthood), since a score of 4 represents a balanced use of natural and built environments. Similar to the adults, the child subjects are using built environments more often than natural environments, M=5.37 ± 1.20, where the score of 4 represents a balanced use of natural and built environments.

**Familiarity Levels**--As indicated by familiarity ratings, it appears that the sample as a whole is less familiar with built environments than with natural or intermediate environments and this pattern continues across the lifespan from childhood into adulthood despite increasing experience for all three environment types (see Figure 5). During childhood, the adults indicated that they were more familiar with natural (M= 4.84 ± 1.17) and intermediate environments (M= 4.19 ± .97) than with built environments (M= 3.73 ± 1.14). Currently, both adult and child subjects indicated that they feel more familiar with natural (M= 5.37 ± 1.0 all subjects, 4.67 ± 1.03 for children, 5.71 ± .81 for adults) and intermediate (M= 4.54 ± 1.05 all subjects, 4.00 ± .93 for children, 4.82 ± 1.00 for adults) than with built environments (M=3.96 ± 1.35 all subjects, 3.27 ± 1.08 for children, 4.29 ± 1.34 for adults). Completed t-tests indicate that the means associated with each type of familiarity are significantly different from each other, for all of the subjects. Also the means for natural, intermediate and built familiarity are significantly different between adulthood and childhood for the adult subjects, showing that familiarity is increasing across the lifespan for all types of environments.

The fact that the sample as a whole indicated higher familiarity with natural environments than built appears to contradict the results in the previous section indicating that all subjects spent more time in built environments than natural places. For example, it

is surprising that large amounts of time spent in built environments does not lead to high levels of familiarity for built settings. However the familiarity score for built environments is based upon the mean score for several different types of built environments. Therefore, if an individual spends large amounts of time in built settings but is familiar with only one or two types of built settings, the relationship between familiarity and activity location will not be correlated. This apparent contradiction is possibly due, then, to the method of measuring familiarity using a range of environments within each category.

**Environmental Values**--The Pastoralism and Urbanism scores can range from 0 to 100 and the ERI inventory has a built-in subject reliability scale across the inventory. Each of the 96 subjects had a high communality score indicating reliability in response and as a group they had a higher value for pastoralism ($M = 83.27 \pm 10.74$ for all subjects, $89.25 \pm 12.16$ for children, $80.28 \pm 8.60$ for adults) than for urbanism ($M = 49.11 \pm 10.60$ for all subjects, $49.78 \pm 13.47$ for children, $48.78 \pm 8.93$ for adults), as shown in Figure 6. Scores comparing values during childhood and adulthood for the adult subjects were not available since the adults would need to complete the values survey based on childhood memories with presumably low reliability.

**Preferences**--As expected, t-tests indicate that all subjects show a significantly higher preference for natural scenes ($M = 6.22 \pm .62$ all subjects, $6.12 \pm .74$ for children, $6.26 \pm .54$ for adults) than intermediate ($M = 5.23 \pm .67$ for all subjects, $5.10 \pm .69$ for children, $5.27 \pm .66$ for adults) or built ($M = 4.11 \pm .84$ for all subjects, $4.18 \pm 1.0$ for children, $4.06 \pm .75$ for adults) environmental scenes. These results are exhibited in Figure 7. The lower score for built scenes does not indicate dislike for such scenes, since a score of 4 indicates "neither like nor dislike" the subjects were indicating a lack of affect one way or the other. Scores comparing preferences during childhood and adulthood for the adult subjects were not available since it is not possible for adults to complete preference tests based on childhood memories.

**Sex Differences**--In order to assess sex differences for all of the variables listed above, two-tailed *t*-tests were performed for all childhood and adulthood residence, recreational behavior, familiarity, value and preference measures. For adults the primary sex differences exist for amount of daily time spent outdoors during childhood, males spending more time than females [$t(62) = 3.08$, $p<.01$]; daily time spent outdoors during adulthood, males spending more time than females [$t(61) = 3.15$, $p<.01$]; familiarity with natural environments during childhood, males having more familiarity than females [$t(61) = 2.09$, $p<.04$]; and pastoralism values as adults, females having a higher average score than males [$t(62) = -2.02$, $p<.05$]. These analyses indicate that despite the fact that males spend more time outdoors during childhood and adulthood, and are more familiar with the natural environment, females have higher levels of pastoral values during adulthood. Significant sex differences were not obtained for any other variables analyzed.

For the child subjects no significant sex differences were found. However, a trend was indicated for sex differences for familiarity with built environments [$t(28) = -1.96$, $p<.06$]; with girls showing higher levels ($M=3.65 \pm 1.07$) than boys ($M= 2.92 \pm 1.0$). This sex difference is expected since girls more than boys are often expected to stay near or within the home for their own protection. No sex differences were found for any of the variables when comparing combined parental scores to children's scores (e.g., boys and combined parent scores vs. girls and combined parent scores). Considering the number of variables included in the analysis it appears that the sex of the child is not a significant factor.

**Age Differences**--In order to assess age differences, two tailed t-tests were performed for recreational behavior, familiarity levels, value dimensions and preferences. Significant age differences did appear for Specific Familiarity levels for all environment types--natural [$t(93) = -5.34$, $p<.01$], intermediate [$t(92) = -3.77$, $p<.01$], and built [$t(93) = -3.65$, $p<.01$]. Not surprisingly, children had less familiarity with all types of environments than adults. A significant age difference was also found for Pastoralism [$t$

(47) = 3.73, $p<.001$], where child subjects had higher pastoral scores ($M= 89.25 \pm 12.16$) than adults ($M=80.28 \pm 8.60$). No other significant age differences were found, including any differences in preference ratings. The fact that preference ratings did not yield a significant age difference was surprising, since previous research has indicated that children show a significantly higher preference for natural environments compared to adults. It is possible that the current results are not consistent with other research because such age differences are more characteristic of younger children. Eleven-year old children are closer in age to adolescence when preference ratings become more variable within individuals and tend to decrease compared to pre-adolescent ratings.

### Analyses of Relationships Among Variables

The analyses designed to explore the interrelations among the various measures are organized into four primary groups, each targeting a particular subset of issues related to preference, and each applied to the adults and children separately. Because the study is exploratory, the order of analyses moves from analyses involving expected relationships between preference and other attitude measures to analyses that are searching for any and all relationships between preference and attitude measures. Due to the exploratory nature of this study, the comparisons made in the analyses are limited.

The first group of analyses is concerned with the relationship between residence and preference, and familiarity and preference. These two relationships are emphasized separately from other attitude measures since residence and familiarity were predicted, on the basis of previous research, to have a strong influence upon environmental preference. As the size of the residence population and familiarity levels with built environments increase, the preference for built landscapes should increase; whereas the preference for natural scenes should remain the same for all residence types and for all levels of familiarity with natural environments.

The second group of analyses of interrelations is concerned with the correlates of each type of preference--such as residence, familiarity, recreational behavior, environmental values and the other two categories of preference. This set of exploratory analyses focuses on the variety of attitude measures that cluster with preference, in addition to the residence and familiarity measures considered in the first analysis set.

The third group of analyses is concerned with explaining preference in terms of all attitudinal variables, considered by multiple regression analysis. Using the stepwise method, this set of analyses will enter each attitudinal measure into a regression statement using preference as the dependent measure. Holding all other independent variables constant, the amount of variance in preference scores that each attitude measure explains will be considered. This is a higher level of analysis than the correlational analysis in the second group, of the way that certain environmental attitude measures cluster with preference . Adjusted R-squares as conservative estimates are used since the sample size is small.

Throughout the second and third sets of analyses, a strong association between preference and environmental values was obtained. Therefore, environmental values were explored further, by multiple regression analysis, in the fourth group of analyses. Specifically the goal here was to explain environmental values in terms of all attitudinal variables, including preference. Again, the stepwise method was used to ascertain the amount of variance in environmental values that each attitude measure explains and adjusted R-squares are reported as a conservative estimate.

## Analysis Group 1--Relationship between Residence and Preference

## Relationship between Familiarity and Preference

### Adult Preference

1. CURRENT RESIDENCE, CHILDHOOD RESIDENCE and SCENE PREFERENCE

In order to assess the relationship between residence and preference, several one way ANOVAs (RESIDENCE X NATURAL PREFERENCE, RESIDENCE X INTERMEDIATE PREFERENCE, and RESIDENCE X BUILT PREFERENCE) were performed on the adult data using three different classifications of residence type. In all of the analyses the dependent variables were either the natural, intermediate or built preference types. First, the Population Size measure was utilized for residence type. For the Childhood Residence analysis this measure was also divided into four life period categories. In the second set of ANOVAs the Population Mean score was used for both the Current and Childhood analyses. In the third set of analyses the Description measure was used for both the Current and Childhood analyses. In all sets of analyses the dependent variables were the natural, intermediate and built preference types. The preference data is based on an ordinal scale which means that it is technically improper to perform analyses of variance on such data. However, "these restrictions are almost universally disregarded, largely because statistical research has shown that in most instances violations of the assumptions underlying the use of parametric techniques do not lead to serious distortions of their results.", (Oskamp, 1977, pg. 37). Since the distributions of the preference measures are unimodal and the variances are similar, it is assumed that use of parametric statistics will not produce misleading conclusions.

CURRENT ADULT RESIDENCE-- Results of the analyses using Population Size revealed significant main effects for Intermediate Preference [$F$ (3,59) = 2.90, $p$<.04] and a trend for Natural Preference [$F$ (3,59) = 2.38, $p$<.08]. In both cases, preference decreased

with population size such that those in rural residences have higher preferences for intermediate type of environments and a similar trend is indicated for natural environments as well. Table 3 summarizes the means associated with each of the preference types by residence type. When the Population Mean measure was utilized, significant main effects were shown for Natural Preference [$F$ (1,59) = 4.52, $p$<.04] and Intermediate Preference [$F$ (1,59) = 5.68, $p$<.02]. In both cases the rural subjects indicated a higher preference than the urban subjects. The related means are located in Table 4. When the Description measure was used, significant main effects were indicated for Natural Preference [$F$ (2,56) =5.53, $p$<.01], showing that those from more rural residences have the highest preference for natural environments (see Table 5). The fact that natural preference in adulthood is related to adult residence type indicates that preference and residence choice are clustered expressions of environmental attitude in adulthood, although it does not mean that natural preference development is dependent upon residence size. It is striking that built preference, which was predicted to be related to adult residence type, was not found to be significantly related to residence type for any of the residence measures.

CHILDHOOD RESIDENCE--Results of the analyses using Population Size and Population Mean for residence type did not indicate any significant main effects for any of the age categories. However, when the Description measure was used (i.e., verbal descriptions that indicated rural or urban residence) significant main effects were found for Intermediate Preference [$F$ (2,49) = 4.83, $p$<.01] and a trend for Built Preference [$F$ (2,49) = 3.06, $p$<.06]. Those subjects who described themselves as having had a rural residence during childhood rated intermediate environments the highest, while the trend in built preference indicated that the highest ratings for built environments came from those with an urban childhood residence. Table 6 includes the associated means. It is not surprising that those with rural childhoods prefer intermediate scenes since many of the scenes from that category include natural features. The interesting result here is the trend indicating that there is a relationship between urban childhood experience and built preference in

adulthood. However, the results are not strong support for such a statement. This group of results does indicate support for the point that natural preference is less dependent upon experience since ratings are similar for all adults despite differences in childhood residence. This point appears to be in conflict with previous studies showing that when child and adult subjects are describing "favorite" places during childhood, both groups mention natural places more frequently than built places (e.g., Francis, 1988; Lukashok & Lynch, 1956). The current results are not in conflict with these studies, they merely suggest that residential factors during childhood are not as influential as other developmental factors for adult expression of natural preference.

2. CURRENT FAMILIARITY LEVELS, CHILDHOOD FAMILIARITY LEVELS, and SCENE PREFERENCE

Correlational analyses were performed on the adult data to observe the relationship among the three types of scene preference and the two types of familiarity measures. The first familiarity measure was the General familiarity rating (see page 81) that the subject provided for natural, intermediate and built environments and the second measure was the Specific familiarity ratings for settings within each of the three categories of natural, intermediate and built preference. The results indicate that none of the three preference types was significantly related to either measure of familiarity. Adult preference was unrelated to both childhood and adulthood familiarity for all of the environment types. This lack of relationship was expected for natural environments but was not an expected result for the built environments. It was predicted that familiarity with built environments during childhood would be strongly correlated with adult preference for built places. As was discussed in a previous section, many studies have shown that familiarity and preference are related while other studies have not found support for such a relationship. It was also discussed that the reason such differences have occurred due to significant methodological differences. One explanation for the contradiction between the current results and previous studies showing a relationship between preference and familiarity is that the measures of

familiarity used in the present study were much more stringent than previous studies. The subjects were required to rate familiarity with 26 different specific types of environments, including several built and natural places. In contrast, many previous studies have included only one question regarding general familiarity for natural and/or built environments. It may be that when a subject does not have specific way to figure out the answer to a general question of familiarity, they may actually use feelings of preference as a gauge for familiarity, thus yielding an artifactual relationship between preference and familiarity. However, when subjects are forced to rate familiarity in regard to specific environment types, as was the case in the present study, the relationship between familiarity and preference may break down. In this case, the subjects had a specific environment to think about in terms of their experience, thus preference was not useful for answering the question and did not appear to be related to familiarity. Other experimenters have asked subjects to rate the level of familiarity with slide projected scenes prior to or after rating the scene for preference. The same methodological situation exists here where the subject is possibly using his or her affective reaction to the presented slide in order to gauge the familiarity with such an environment type instead of memories of experience. The current study did not present a specific scene with the familiarity question which allowed each subject to utilize other methods of determining familiarity. Again, this type of presentation may have influenced the results regarding the relationship between preference and familiarity.

### Children's Preference

1. CURRENT RESIDENCE and SCENE PREFERENCE

Several one way ANOVAs (RESIDENCE X NATURAL PREFERENCE, RESIDENCE X INTERMEDIATE PREFERENCE, and RESIDENCE X BUILT PREFERENCE) were performed on the children's data using the three different residence classifications--Population Size for two life periods, Population Mean score, and the

Description measure. In all analyses the dependent variables were either the natural, intermediate or built preference types.

Results of the analyses indicated no significant main effects for any of the three residence measures although there was a trend shown for Built Preference when the description measure was utilized [$F(2,28) = 3.07$, $p<.06$] suggesting that those who live in urban residences have a higher preference rating for built scenes (see Table 7). Again these results indicate support for the idea that the development of natural preference is not dependent upon residence experience, but that built preference is dependent upon urban residential experience. These results are similar to the analyses for the adults, both groups showing no relationship between natural preference and childhood residence, and a trend in the relationship between built preference and urban living during childhood.

2. FAMILIARITY LEVELS and SCENE PREFERENCE

Correlational analyses were performed to study the relationship between familiarity level and preference for scene types. Two measures of familiarity were used, General Familiarity and Specific Familiarity for each environment type (as estimated by the parent most familiar with the child's activities). Scene Preference was based on the average score of ratings provided by the child for each of the three types of videotaped scenes. Results indicate that there are no significant correlations between general familiarity or specific familiarity with preference of any type. An additional correlational analysis was completed for the relationship between each specific video scene and the familiarity level rating for that specific video scene (e.g., the familiarity level for an ocean landscape compared to the preference rating for the ocean scene in the videos). Again there were no significant correlations shown. Similar to the adults, there is no relationship between familiarity and preference for children. This result was not expected but, as discussed previously, may be a result of using more stringent measures of familiarity in the current study. Conflicting research results regarding the relationship between familiarity and preference may mean that familiarity must be measured carefully in future studies of preference development.

## Analysis Group 2--Correlates of Preference

### Adult Preference

Correlational analyses were performed in order to determine the relationship between preference and other childhood and adulthood attitude measures. To report the results, the attitude measures below have been organized into meaningful clusters although in the analysis each attitude measure was separately compared to the three types of environmental preference--natural, intermediate, and built. In this research report, only the correlates of preference are considered although many other relationships could exist between the other attitude measures. Table 8 summarizes the correlation statistics.

Preference --Natural Preference is significantly positively correlated with Intermediate Preference ($r$=.60, $p$<.01) and Intermediate Preference is positively correlated with Built Preference ($r$=.59, $p$<.01). These results are supportive of the point that intermediate scenes are a halfway point between natural and built preference. The fact that the correlation between natural and built preference is significant but very small ($r$=.29, $p$<.03) indicates that the two preference types may be separate measures of environmental affect.

Residence--Adult Residence (Population) and Intermediate Preference are negatively related ($r$= -.34, $p$<.01) such that as population size increases the preference for intermediate environments decreases, a result indicated in the first set of analyses. Again it was expected that childhood residence in urban populations would be strongly related to built preference, but the correlation between these two variables is not significant ($r$=.03, $p$<.81).

Behavior--Adult Activity Location evidenced a significant positive relationship to Built Preference ($r$=.31, $p$<.02), where the more active an adult is in built settings the higher the preference rating for built environments. This result indicates support for the idea that built preference clusters with recreational activity location choice as part of a larger

environmental attitude. However, anticipated significant relationships between childhood behavior variables (such as childhood familiarity levels and activity locations) and adult preference were not indicated. Similar to previous results discussed, there were no indicated relationships between Adult Familiarity and Preference for any of the environment types.

Values--Pastoralism was significantly positively correlated with Natural Preference ($r$=.36, $p$<.01), such that the more an individual valued natural processes the higher he/she rated natural environments. This indicates consistency in attitude towards natural processes and environments. Against expectations there was no evidence of a relationship between Built Preference and Urbanism values.

### Children's Preference

Correlational analyses were performed in order to determine the relationship between preference and other attitude measures. The attitude measures below are compared to the three types of environmental preference--natural, intermediate, and built. Table 9 indicates the significant correlates of preference.

Preference--Significant positive correlations were evident between Natural and Built Preference ($r$=.40, $p$<.01), Natural and Intermediate Preference ($r$=.84, $p$<.01) and Intermediate and Built Preference ($r$=.53, $p$<.01). These results were surprising since it was predicted that natural and built preferences are opposing environmental emotions and would not be related. These results suggest that affect for different types of environment may group together to form an attitude towards the physical environment in general, and this general attitude could be one of negative or positive affect towards all environment types. It is possible, then, that children's environmental attitudes are not necessarily separate responses for natural and built environments but may be general ability to appreciate the beauty of any type of landscape.

Residence--The only relationships that were significant were the positive correlation between Built Preference and Residence (Description) ($r$=.35, $p$<.03) and Residence (Population Size) for the life period from age 6-11 years ($r$=.38, $p$<.02). These results support the prediction that Built preferences are related to experience, specifically to residence during childhood. The importance of the experience during 6 to 11 years of age further supports previous research in preference development, showing that artistic preferences are not evident until age 11 but experiential factors prior to that age influence the expression of preference when it does emerge. The fact that Natural preference and Residence are not significantly related is support for the suggestion that natural preferences are not dependent upon experience.

Behavior--Activity Location and Built Preference were significantly related in a positive association ($r$=.34, $p$<.03), indicating that those who play in built settings also show higher preferences for built preference. This does not mean that playing in built environments leads to built preference, but suggests support for consistency in built environmental attitude expression in children, in this case, recreational location and preference measures.

Values--Significant positive correlations were found between Pastoralism and Natural Preference ($r$=.64, $p$<.01) and Intermediate Preference ($r$=.64, $p$<.01), and between Urbanism and Built Preference ($r$=.56, $p$<.01). Compared to other correlations, the relationship between values and preferences appears to be much stronger. It is reasonable that values for natural processes would be associated with natural preference as well as with the intermediate scenes with frequent natural features. It was also expected that urbanistic values and built preferences would be associated. In both cases, the results support the idea that attitude expression is consistent between values and preferences.

Parental Attitude Measures--The only variable that showed up as a significant positive correlation between the child and the combined parental scores for all attitudinal variables was Natural Preference of the parents and Natural preference of the child ($r$=.36,

$p<.05$). Upon further analysis of separate parental scores in relation to the children's scores, it appears that mother's Natural Preference is significantly correlated to the child's ($r=.50$, $p<.01$), but that this relationship is not significant for the father. The absence of a similar correlation between parents and child for Built Preference is puzzling, although it may be that child subjects are still developing their preference for built settings and that built preference is not fully expressed as early as age 11. The fact that children are similar only to their mothers in rating natural scenes could be considered as support for the point that family experience influences the development of natural preference. The mothers were frequently considered to be the parent most qualified to answer questions regarding the child's environmental experience and most couples estimated that the mother had spent more time with the child. It may be then that the more time a parent spends with a child the more influence that parent's natural preferences have on the child's natural preferences. It is not clear why this mother-child relationship was not evident for built environments.

This mother-child relationship for natural preferences could also be interpreted as support for a genetic predisposition to prefer natural scenes since the biological mother and child share in the same response to the environment. However, the fact that biological fathers do not share in this same relationship appears contradictory to this interpretation. There are examples of genetic influence originating from one parent or the other (e.g. the trait of baldness is primarily influenced by the mother's genes), but it is not clear that such sex-related genetic influence is operating in the case of natural landscape preferences. These results do at least indicate that some aspect of the mother-child relationship is important for the development of natural preference.

## Analysis Group 3--Regression Equations Explaining Preference

### Adult Preference

1. REGRESSION ANALYSIS OF ATTITUDES ONTO PREFERENCE

Three multiple regression analyses for each of the three types of preference were performed to determine the unique contribution of the factors of Childhood and Adulthood Residence, Activity Location, Familiarity, and Values. Residence was defined as the population mean score and verbal descriptor in each of the three equations. Scores for Activity Location, Specific Familiarity for natural, intermediate and built environments, Pastoralism and Urbanism were also entered into the equation. The dependent variable in the three analyses was preference type--natural, intermediate or built.

The stepwise regression method was utilized in order to obtain the unique contribution of attitudinal variables to each preference type as follows:

Natural Preference--Pastoralism [Partial $F(1,52) = 7.96$, $p<.01$] explains 12% of the variance for Natural Preference scores. For this result, Table 10 indicates the beta weight and adjusted R-squares (adjusted R-squares are reported for all regression analyses in this research due to the small sample size). This result is consistent with previous results showing that values cluster with preference, particularly for natural environments. The analysis supports the prediction that familiarity and residence are not related to natural preference since experience should not influence natural preference to the same extent as for built preference. It is surprising that recreational activity location does not produce a significant causal influence on natural preference, suggesting that there is little consistency between environmental affect and behavioral response towards natural environments.

Intermediate Preference--Adult Residence (Population Size) [Partial $F(1,52) = 7.82$, $p<.01$] explains 12% of the variance for Intermediate Preference scores and is associated with a negative beta weight. This is supportive of previous results in this study

showing that as the subject's residence size increases, the preference ratings for intermediate environments decreases.

Built Preference--Adult Activity Location [Partial F (1,52) = 6.01, p<.02] explains 9% of the variance for Built Preference scores. It is unexpected that the only variable that can explain adult built preference is activity location. This result indicates consistent attitudinal expression for built environments through preference and recreation location choice, but suggests that there is little consistency when considering familiarity levels, residence, or values--although these results are consistent with adult data discussed above.

In summary, there is indicated consistency between affective, cognitive and behavioral components of attitude for the adults. However, this consistency exists across the three types of preference, not for every type of preference. This means that when considering the combination of the analyses for all three preference types above there is evidence of relationships between preference and cognitive and behavioral measures. But within each type of preference only a portion of the three attitude components was evident (e.g. natural preference has a relationship with cognitive measures but does not show a relationship to any type of behavioral measure). Interestingly, no childhood variables explained the variance in any of the preference types which leaves a large gap in explaining the development of adult preference.

### Children's Preference

#### 1. REGRESSION ANALYSIS OF ATTITUDES ONTO PREFERENCE

For each of the three types of preference a multiple regression analysis was performed to determine the unique contribution by Child's Residence, Activity Location, Familiarity, and Values. The independent measures utilized were the same as the adult regression models except that only children's data was used. The dependent variable in the three analyses was preference type--natural, intermediate or built.

The stepwise regression method was utilized in order to obtain the unique contribution of variables to each preference type as follows:

Natural Preference--Pastoralism [Partial F (1,26) = 26.35, p<.01] explains 48% of the variance for Natural Preference scores. Table 11 indicates the beta weight and adjusted R-square for this result. This result supports the findings for the adults and suggests consistency between affective and cognitive measures of environmental attitude. It was expected that Natural preference and Pastoralism values would be related.

Intermediate Preference--Pastoralism [Partial F (1,26) = 18.70, p<.01] explains 40% of the variance for Intermediate Preference scores, while Specific Intermediate Familiarity [Partial F (2, 25) = 12.89, p<.01 with a negative beta weight] and Urbanism [Partial F (3,24) = 11.36, p<.01] each explain 7% of the variance. Therefore 54% of the variance in Intermediate Preference scores is explained by these three variables. It is important to remember that intermediate preference represents the halfway point between natural scenes and built scenes. Therefore it is reasonable to find that Intermediate preference is related both to values for natural processes (Pastoralism) and cultural processes (Urbanism). According to these results, if one values both types of processes then one's preference will tend to be balanced between the two types of environments. This is evidence that environmental affect and cognition are consistent for intermediate scene tyeps.

The result concerning familiarity and preference is one of the few significant relationships of its type found in this research. The result is an unexpected finding, suggesting that as one increases one's familiarity for intermediate environments, the level of preference for such scenes decreases.

Built Preference--Urbanism [Partial F (1,26) = 15.10, p< .01] explains 34% of the variance and Pastoralism [Partial F (2,25) = 13.81, p<.01] explains 15% of the variance in Built Preference scores. Therefore, 49% of the variance in Built Preference scores is explained by both value dimensions. A negative beta weight is associated with

Pastoralism, as indicated in Table 11. This relationship is very different than for the adult data since both Urbanism and Pastoralism values are related to Built preference. This result combined with the results for Natural preference, suggests a strong relationship between values and preference for children. It is surprising that behavioral measures of activity location, residence, and familiarity with built environments did not explain a significant amount of the variance in built preference of children. These variables do not appear to influence preference development in an obvious manner.

2. REGRESSION ANALYSIS OF PARENTAL ATTITUDES ONTO PREFERENCE

Two groups of three multiple regression analyses were performed to determine the unique contribution of Parental Residence, Activity Location, Familiarity, and Values to each of the three types of preference for child subjects. The independent measures utilized were the same as the adult regression model but for one set of regression statements the scores were Separate Parent Scores and for the other set the scores were Combined Parent Scores. The dependent variable in the three analyses was the child's score for each preference type--natural, intermediate or built.

The stepwise regression method was utilized in order to obtain the unique contribution of variables to each preference type as follows:

Natural Preference--Parental Natural Preference [Partial $F$ (1,24) = 6.67, $p<.02$] explains 18% of the variance for Natural Preference scores while Adult Residence (Population Size) [Partial $F$ (2,23) = 7.50, $p<.01$] explains 16% of the variance. Table 12 indicates the beta weights and adjusted R-squares for these results. Similiar to the correlational analyses discussed previously, parental natural preference appears to be related to the expression of natural preference in children but in this case residence does explain some of the variation in response. The fact that only one residence measure amongst several other experiential variables is related to natural preference, suggests a minimal relationship between experience and natural preference.

Intermediate Preference--Father's Adult Activity Location explains 11% of the variance for Intermediate Preference [Partial $F(1,28) = 4.54$, $p<.04$], indicating that fathers who spend more time in built settings have children who tend to have a higher preference for intermediate environments.

Built Preference--Father's Specific Childhood Built Familiarity [Partial $F$ (1,28) $=5.34$, $p<.03$] explains 13% of the variance in children's Built Preference scores. This suggests that the father's experience with built environments in childhood is related to his children's preferences for built settings.

In summary of these results it appears that each type of preference is influenced by parental preferences or by parental behavior in environments. The child's natural preferences are influenced by parental natural preference and by their residence choice. As was discussed in the correlational analysis section, natural preferences were not expected to be influenced by family experience. It is clear that experiential variables are important in the development of natural preference. The results for the child's Intermediate and Built preferences are similar in that they both indicate that the father's experience and behavior is important for children's preference. Why this relationship occurs only for fathers and only for these two preference types is not clear. But in conjunction with previous analyses showing that mothers more than fathers influence natural preferences, it appears that each parent may provide a complimentary role in the development of preferences. Mothers may have primary influence on the child's natural preferences through their own preferences and fathers may have primary influence on the child's built preferences through their behavior in the environment. Whether their roles are complimentary or not, the important point is that parental attitudes have an impact upon the developing attitudes of the child.

## Analysis Group 4--Environmental Values

### Adult Values

1. REGRESSION OF ATTITUDE ONTO ENVIRONMENTAL DISPOSITION

It is apparent that there is a strong relationship between preference and values for the child subjects, and a weaker relationship for the adults. Therefore, further analyses of this relationship were undertaken in order to determine if variation in environmental values clarify the developmental process for preference. The two ERI scores of Pastoralism and Urbanism were submitted to separate regression analyses in order to determine which variables, Adult and Childhood Residence, Activity Location, Familiarity and the 3 Scene Preference types, would best predict the individual's scores for Pastoralism and Urbanism. The measures for the independent variables are the same as previous adult regression analyses. The stepwise method of analysis was utilized and indicated the unique contribution of specific variables to environmental values as follows:

Pastoralism--Natural Preference explains 11% of the variance in Pastoralism scores [Partial $F(1,53) = 7.83$, $p<.01$] while Built Preference with a negative beta weight [Partial $F(2,52) = 10.01$, $p<.01$] explains 14% of the variance. The beta weights and adjusted R-squares associated with these results are presented in Table 13. Therefore, values for natural processes are associated with high ratings for natural scenes and low ratings for built scenes. The strong relationship between values and preference are indicated here for Pastoralism. The absence of childhood variables explaining pastoral values is unexpected but consistent with the rest of the results presented.

Urbanism--Adult Built Familiarity explains 12% of the variance in Urbanism scores [Partial $F(1,53) = 8.60$, $p<.01$] while Childhood Natural Familiarity with a negative beta weight explains 7% [Partial $F(2,52) = 7.42$, $p<.01$] and Childhood Built Familiarity explains 5% [Partial $F(3,51) = 6.77$, $p<.01$]. These three variables together account for 24% of the variance in Urbanism scores for adults. Urbanism in the adult subjects, is

shown to be strongly associated with familiarity with specific environments, both during adulthood and childhood. This is a reasonable relationship because it is often, but not always, necessary to experience something prior to having value for it. It is disappointing that Urbanism is not associated with Built preference at a significant level, since that pattern would be consistent with the relationship between Pastoralism and Natural Preference. Perhaps the two relationships represent different processes, a difference that was expected to be true for the development of natural and built preference.

**Children's Values**

1. REGRESSION OF ATTITUDE ONTO ENVIRONMENTAL DISPOSITION

The two ERI scores of Pastoralism and Urbanism were submitted to separate regression analyses in order to determine which variables, Child Residence, Activity Location, Familiarity and the 3 Scene Preference types, would best predict the child's ERI scores. The measures for the independent variables are the same as previous regression analyses for the children. Stepwise method of analysis was utilized and indicated the unique contribution of specific variables to environmental values as follows:

Pastoralism--Natural Preference explains 48% of the variance in Pastoralism scores [Partial $F$ (1,26) = 26.35, $p<.01$] while Residence (Description) explains 8% of the variance [Partial $F$ (2,25) =18.14, $p<.01$]. Therefore 56% of the variance in Pastoralism scores is explained by these two variables. The beta weights and adjusted R-squares associated with these results are presented in Table 14. The strong relationship between values and preference are exhibited again in this regression statement but the contribution of residence was unexpected, since throughout much of the analyses, natural preference, a close associate of Pastoralism, and residence were unrelated. This result suggests that experience may influence the development of pastoral values.

Urbanism--Built Preference [Partial $F$ (1,26) = 15.10, $p<.01$] explains 34% of the variance in scores for Urbanism, Natural Preference with a negative beta weight explains

21% of the variance [Partial F (2,25) = 17.59, p<.01], and Activity Location [Partial F (3,24) = 15.53, p<.01] explains 7% of the variance, so that 62% of the variance is explained by these three variables. Here environmental values are explained by preferences again. The value for cultural processes is associated with high built preference ratings, low natural preference ratings and a large amount of leisure time spent in built locations. This is a good example of attitude consistency where affect, cognition and behavior are supportive of a larger environmental attitude. These results are very different from the adult analyses where only familiarity explains urbanism, suggesting that a developmental process is underway or perhaps that there are cohort differences influencing the results.

2. REGRESSION OF PARENTAL ATTITUDE ONTO ENVIRONMENTAL DISPOSITION

The two ERI scores of Pastoralism and Urbanism were submitted to separate regression analyses in order to determine which variables, Parental Residence, Activity Location, Familiarity and the 3 Scene Preference types, will best predict the child's ERI scores. The measures for the independent variables are the same as previous regression analyses for the children. Two different sets of analyses were completed using two different sets of independent measures on the parents. The first set used Combined Parental scores and the second set used Separate Parent scores. Stepwise method of analysis was utilized and indicated the unique contribution of specific variables to environmental values as follows:

Pastoralism--Combined Parental Natural Preference [Partial F (1,24) = 7.33, p<.01] explained 20% of the variance in scores for Pastoralism, while in a separate equation, Mother's Pastoralism [Partial F (1,25) = 8.0, p<.01] explained 21% of the variance. The beta weights and adjusted R-squares associated with these results are presented in Table 15. These results support the consistent finding that Pastoralism and Natural Preference are related, both within an individual and within a family. It is interesting that previously it was found that the mother's natural preference scores are

related to the child's and here Pastoralism scores are similar for mother and child as well. It appears that the mother-child relationship is extremely important for the development of natural preference and for pastoral values.

Urbanism--Parental Urbanism [Partial F (1,24) = 4.59, p<.04] explained 13% of the variance in Urbanism scores, while in a separate equation Mother Pastoralism [Partial F (1,25) = 6.08, p<.02] explained 16% of the variance with an associated negative beta weight, and Mother Urbanism [Partial F (2,24) = 6.02, p<.01] explained 12% of the variance. These results indicate further support for the intergenerational transmission of environmental values since urbanism is similar within a family. It is interesting that the mother-child relationship is again a major contributor to the development of values. The fact that the mother's Pastoralism values have such a strong influence on the development of Urbanism and Pastoralism in their children implies that Pastoralism is an important variable to attend to in future studies of family attitudes toward the environment. The fact that Urbanism is not related to parental Built preference is further support for the suggestion that the relationships between Natural Preference and Pastoralism and between Built Preference and Urbanism, represent two different processes in the development of preference. Both Natural and Built preferences are influenced by environmental values, and the child's values are strongly influenced by Parental values. Therefore although the actual values supporting Natural and Built preference may differ, both types of preference are strongly associated with personal values and with parental values. These results were predicted and are supportive of personal consistency in attitude expression and intergenerational transmission of attitudes from parent to child.

## Discussion

### Environmental Preference

Regarding environmental preference, this study demonstrated that (1) for adult subjects, preference is related to other environmental attitude measures such as residence, recreational activity location, and values during current adult experience but weakly related to "remembered" childhood environmental experience; (2) for child subjects, preference is related to their own residence, recreational activity location, and values, as well as to their parents' activities and preferences. Regarding the first pattern in adults, natural and intermediate preference is significantly higher in rural adults compared to urban adults, whereas, built preference is not significantly different between groups. These results are contradictory to predictions that natural preference would be similar across residential groups and that built preference would be significantly higher in urban residents, a prediction that is supported by results from adult subjects' childhood and from the child subjects which show a trend ($p < .06$) indicating higher built preference in those with urban residences. Therefore, it may be that the relationship between residence and preference exists during childhood but disappears during adulthood when residence is chosen based on job opportunities and other values. Those adults who live in urban residences do not particularly prefer built scenes in this study, but presumably continue to live in urban places in order to work and have a more consistent or higher income. Those adults who live in rural places have chosen to live there despite the lower income and job opportunities and should show a high preference for natural scenes, a relationship which was evident in this study. The conclusion is that there is a relationship between preference and type of residence during development but that relationship changes as factors such as employment needs change in adulthood.

For the adults, natural preference was strongly related to pastoral values, intermediate preference was related to residence size, and built preference was related to

activity locations during leisure time. It appears, then, that there may be categorical differences in environmental affect and there may be two processes at work: natural preference relates to environmental values and built preference relates more to environmental behavior. This same categorical difference is evident in the data for child subjects, although they had a larger number of attitude measures that correlated with preference. Specifically for children, natural and intermediate preference is related to pastoral values, while built preference is related to residence, activity location and to urbanism values. Again the pattern appears to be that natural preference is related to values and built preference is related to behavior.

In contrast to adults, children also show a relationship between built preference and values. It is not clear why such categorical differences in environmental affect would exist and why the relationship between built preference and values differs between age groups. Perhaps the processing of environmental affect for natural and built places begins to differentiate during development. Upon inspection of the relationships among children's preference and parental attitude measures it became apparent that natural preference in children is strongly related to parental natural preference whereas built preference is instead related to parental activity location and familiarity with built settings. Each type of preference is influenced by different factors during family experience and development.

What is interesting is that each type of preference is not only influenced by different parental attitude measures but each type of preference is also differentially influenced by either the mother or the father. The mother's natural preferences have more influence upon the child's natural preference and the father's activity and familiarity influence the child's built preference more than the mother's. The fact that each type of preference is influenced by one parent more than the other and that each type is influenced by one kind of behavior by the role model more than another behavior, would begin to explain how environmental affect develops and why it differs for natural and built places.

Two relationships were expected--the relationship between preference and childhood experience in the adult subjects and between preference and familiarity with each type of environment. These relationships did not appear to be supported upon analysis. There were no significant findings relating adult preference to any of the childhood measures such as residence, activity location, and familiarity. This was surprising considering that in the current study there is clear evidence that parents influence children's preference. There are any number of explanations for the lack of relationship between developmental experience and adult preference. First, perhaps the memory of the adults for their childhood experience is weak and incomplete. However, adult recollection of childhood environmental experience has been described as fairly complex (David and Weinstein, 1987; Lukashok and Lynch, 1956) and none of the adults in the current study found it difficult to respond to this part of the survey. In fact, one would expect that if adults are dealing with weak memories they would "reconstruct" their memories to match their current preferences in order to decrease dissonance. The results of this study do not support that point. Second, it may be that preference is not related to childhood experience but that other environmental attitude components are related to childhood experience and those components then influence preference in adulthood. For example, it may be that activities in built locations during childhood lead to a value for built environments in adulthood which then influences built preference in adulthood. The original attitude component may not be directly related to preference but is certainly involved in the development of preference through other attitude components. Third, it may be that preference is directly related to some childhood experience that was not measured in the current study.

The other relationship that was expected was between familiarity and preference. Although the empirical evidence is in disagreement about the nature of this relationship, it was predicted that built preference, in particular, would be strongly related to familiarity with built settings. However, this relationship was not significant for any of the subject

groups. Familiarity with built settings, as measured, was not related to built preference. Measures similar to familiarity such as activity location (recreating in built places) and urban residential experience were related to built preference. It is not clear whether the relationship between familiarity and preference does not exist or whether the method of measurement was to blame. As discussed previously, familiarity can be measured in many ways, but it is suggested that the measures of familiarity used in the present study were much more stringent than those used in previous studies. In the present case, subjects were required to rate familiarity with 26 different specific types of environments, including several built and natural places. In contrast, many previous studies have included only one question regarding general familiarity for natural and/or built environments. It may be that when a subject does not have specific ways to figure out the answer to a general question of familiarity, they may actually use feelings of preference as a gauge for familiarity, thus yielding an artifactual relationship between preference and familiarity. However, when subjects are forced to rate familiarity in regard to specific environment types, as was the case in the present study, the relationship between familiarity and preference may not appear. Subjects had a specific environment to think about in terms of their experience, thus preference was not useful for answering the question and did not appear to be related to familiarity. Other experimenters have asked subjects to rate the level of familiarity with slide projected scenes prior to or after rating the scene for preference. The same problem exists with this method as before, where the subject is possibly using his or her affective reaction to the presented slide in order to gauge the familiarity with such an environment type instead of memories of experience. The current study did not present a slide of a specific scene with the familiarity question which allowed each subject to utilize other methods of determining familiarity. This study, then, asked the subject to rate their own familiarity level with several specific natural and built environments without any actual scene presented at the time. This protocol of uncoupling environmental scenes and

familiarity with different settings may have influenced the results regarding the relationship between preference and familiarity.

### Environmental Values

Environmental values appeared to be the attitude component with the strongest relationship to preference and further analyses were completed in order to inspect the development of environmental values. When environmental values (pastoralism and urbanism) were considered as the dependent measure, the same relationship between preference and values appeared, particularly for child subjects. Pastoralism was predicted by natural preference for both the adults and child subjects, and had a negative relationship with built preference for adults and urban residence for child subjects. These results fulfilled expectations that values for nature would be associated with natural preferences and not with built preferences or with urban residence experience. For adults, urbanism was positively related to built familiarity during childhood and adulthood and negatively related to childhood natural familiarity. For child subjects, urbanism was positively related to built preference and built activity location, and negatively to natural preference. These results were also expected since a value for high density living and culture should be associated with built preferences, recreational activities in and familiarity with urban settings, but not with natural preference or familiarity with natural places.

It is important to note that the two separate processes of environmental affect towards natural and built environments discussed previously, are indicated in these results for environmental values. Pastoralism is related to preference while Urbanism is related to behavioral measures such as activity location and familiarity levels. And this differential process is again evident upon review of parental influences upon children's environmental values. Children's pastoral values are strongly related to parental natural preference scores, particularly the mothers' scores. For urbanism, parental value for urbanism is a strong factor with the mothers' scores showing the strongest relationship to the child.

Interestingly, mothers' pastoral scores are negatively related to children's urbanism scores, meaning that the less a mother values nature, the more her child will value high density living. All of these results were expected although it is not clear why children's pastoralism is not strongly associated with parental pastoralism along with parental natural preference.

The fact that urbanism and pastoralism are predicted by entirely different parental behaviors is consistent with the point that values and preferences for natural and built environments are following two different pathways during development. Why these two pathways exist is not clear, but they might play a role in the development of higher levels of preference for natural as compared to built landscapes and features. If a child develops natural preferences and values based more on affect (e.g., preference) and develops built preferences based on behavior (e.g., residence or recreation locations), the two types of preferences may mature at different rates and may be expressed in different ways. It is clear that the two types of environments draw different responses throughout development and particularly in adulthood. Perhaps the process of developing an affective or behavioral bond to an environment influences the response to different scenes. For example, an affective bond to a place may be stronger than a behavioral bond. Or perhaps the affective bond is best measured by preference ratings whereas behavioral bonds are not. Considering the above results, the affective bond typical for natural environments may lead to the higher preference for natural scenes that is typically seen in preference research and the behavioral bond to built places will not lead to high preference or affective ratings. In addition, the different parenting styles between mother and father influence the developing attitudes of children. It is not clear at this point how or why the two developmental pathways proceed during childhood.

## Age and Sex Differences

In general this study showed that preference and values are similar within families. In terms of age and sex differences there were only a few results to discuss. Significant age differences were apparent for familiarity levels for all environment types where children had less familiarity than adults. This is not surprising since children have had less time to explore different types of environments. Children also had significantly higher pastoralism scores compared to adults which was expected based on previous research on values (Bunting & Cousins, 1985; McKechnie, 1974) and natural preferences (Lyons, 1983). It is not clear why an age difference in natural preference and built preference did not appear in this study unless it is because this study utilized older children. The subjects in the current study are closer to adolescence, while previous research utilized children closer to ages 5 years to 8 years. Lyons (1983) and Balling and Falk (1982) did find a general decrease in preference with age, with a significant drop in preference for all types of environments during adolescence. The current results support the findings by Lyons and Balling and Falk.

Other age differences are evident when comparing the correlation statistics for preference and other attitudinal measures in Tables 8 and 9. The data for the children show many more significant relationships between preference and other attitudinal measures than for the adults. This suggests that the components of attitude expression--emotion, cognition and behavior--are more consistent for children than adults. This would be expected since children are only beginning to develop their environmental attitudes and adults, who have developed much of their attitude, are showing more variability or complexity in their attitude expression. This variability would then preclude consistency in attitude measures for the adults. Also, it is important to point out that the children's data show a significant correlation between natural and built preference whereas the adult data does not. Again this difference may be due to the consistency that children show between attitude measures, a result that is weakly indicated in the adult data. An alternative

explanation was discussed in the Results section, suggesting that children may not separate their emotions for natural and built environments until later in development. It is possible that children learn initially to appreciate or not to appreciate the beauty of all environments, which would lead to a significant correlation between natural and built preference as found in this study. It would be later in adulthood that distinct emotional responses to different environments occurs, a result that was indicated by the adult data in this study.

Significant sex differences were not found for any of the variables in the child subject group, although a trend was noted for built familiarity ($p < .06$) where girls are more familiar with built environments than boys. This trend is not surprising since girls are frequently involved in home activities for protection compared with boys. Since familiarity with built settings was not a significant factor in analyses for preference or values, it does not appear that this sex difference is particularly influential. However, activity location could be considered a similar measure to familiarity in that location of leisure activites indicates the types of environments an individual is using on a daily basis, and built activity location was related to built preference and to urbanism values in children. So, if girls do differ from boys in terms of where they are throughout the day, and previous research indicates that they do (e.g., Wolfe, 1978), then one would expect their preferences and values to be different as well. Such sex differences in values and preferences of child subjects did not appear, although further research is needed prior to any final conclusions. No significant sex differences exist for any of the variables when comparing combined parental scores to the children's scores ( e.g., boys and combined parent scores vs. girls and combined parent scores).

For adults, the analyses indicate that despite the fact that the male adults were more familiar with natural environments and spent more time outdoors during childhood and adulthood, it was the female adults who have higher pastoral values during adulthood. This result as it stands appears confusing since one would predict that familiarity in childhood and adulthood would lead to higher values for that particular type of

environment. Why don't males have a high value for nature since they are so familiar with it and why do females value nature so highly when they have not directly experienced it to the extent that the males have?

The results make sense when other results are considered. First, familiarity did not predict preference for anyone in the study so it is not surprising that natural familiarity is not related to preference for the males here. Second, natural preference throughout the study was the variable that was more consistently related to pastoral values than any other variable, including familiarity or any other behavioral measure. Therefore, the fact that natural familiarity did not correlate with pastoral values for the adult males and females is to be expected since that relationship did not show up anywhere else in the results. Also the fact that males spent more time out away from the home is predictable since it is a sex difference that has been found previously in children (Anderson & Tindall, 1972; Hart, 1978; Landy, 1965; Munroe & Munroe, 1971; Newson & Newson, 1968; Wolfe, 1978). Even the fact that females have higher pastoral scores is not surprising, since previous studies have shown that feminity correlates with values for nature in adults (McKechnie, 1974) and in children (Bunting & Cousins, 1985; Hart, 1978). In fact, the personality variables that have been found to be associated with pastoralism (McKechnie,1974), are considered to be traditional feminine traits (e.g., affectionate, aesthetic, complicated, unpredictable). Assuming that many women still express more of these traits than men, it would be expected that females would have a higher pastoralism score than males. Therefore, the fact that females are pastoral despite lack of experience and the fact that males are not significantly pastoral despite large amounts of experience can be explained by traditional sex differences in activities and personality traits.

This is an interesting point in conjunction with the previous discussion of two separate developmental paths for natural and built environmental attitudes. Perhaps these two pathways are more dependent upon the development of personality traits that may be gender-related. The distinct instrumental and expressive personality traits discussed by

Parsons and Bales (1953) and Spence and Helmreich (1978) would be particularly relevant here. A person with an instrumental orientation is goal oriented, independent, self-reliant, and generally insensitive to other perspectives other than their own. An individual with an expressive orientation is sensitive to other perspectives, concerned with interpersonal relationships, nurturant, and emotionally expressive. Perhaps values and preferences for nature are dependent upon expressive traits whereas values and preferences for built places are dependent upon instrumental traits. The results do indicate that natural preferences of children are influenced heavily by the emotional component of attitude expression (expressive) whereas built preferences are influenced by the behavioral component of attitudes (instrumental). Sebba (1991) points out that the natural environment is often described by child and adult subjects as a place that is enjoyed or experienced in its current state and the individual person must adapt to the changes that nature "chooses" to make (e.g., tornadoes, temperature changes). Built environments are often described as places to manipulate, change, and the entire goal of built places is to provide comfort by avoiding change (e.g., thermostats, walls). Further efforts to find empirical support for these distinctions are necessary since it could be argued that nature can be extremely tolerant of manipulation (e.g., reservoirs) and built places can require high levels of adaptation (e.g., busy city streets). Indeed, in previous studies (Hart, 1979) children have been observed manipulating the natural environment to fit their current needs, indicating that they do not view the natural environment as uncontrollable. However, Sebba's descriptions do indicate the possibility of a difference in the "typical" experience of natural and built environments where nature elicits expressiveness and built places elicit behavior oriented towards change or instrumental traits. The different experiences in the two types of environments should lead to very different expectations of their purpose and value.

Females are traditionally described as more expressive than instrumental (Spence & Helmreich, 1978). Therefore, the instrumental-expressive trait model could explain why female adults were more pastoral than males and why mothers were so influential in the

development of natural preference and values in their children. For males, the instrumental trait is more typical. This may explain why the adult males did not prefer nature despite large amounts of experience with it in childhood, since the task in adulthood for traditional males is to play the role of breadwinner, a goal which is not supported by a natural setting. The personality traits McKechnie (1974) found to be associated with high urbanism scores include characteristics that have been considered traditional male characteristics such as skepticism, value for intellectual activity, managerial interests, and an emphasis on critical thinking. It is the instrumental traits of the father combined with his frequent built activities during leisure time and high familiarity levels with built settings, which influence his children's built preference. The values and preferences of the father do play some role in the child's environmental attitudes but primarily it is his behavior that influences the child's development, especially for built settings.

A similar framework to the instrumental-expressive trait response is the agency-communion model of Bakan (1966). Agency is defined as activities that involve support of the individual through development of the self separate from others by self-assertion, self-protection, self-expansion, and mastery of skills. Communion refers to activities that support the involvement of the individual in the larger whole through cooperation, selflessness, openness, and group efforts. Agency and instrumentality appear to refer to similar characteristics, while communion and expressiveness appear to be similar in definition. According to Bakan, agency is typical of males whereas communion is typical of females.

Either set of opposing personality traits (instrumental-expressive or agency-communion) in association with parenting style would influence the development of the child's attitudes for different types of environments. Both the gender of the child and the gender of the parent could influence attitude development towards natural and built environments since these personality dimensions are often gender based. But it could also be that residence and activity locations determine the expression of these traits regardless of

the child's gender. For example, a rural child may develop instrumental attitudes toward natural places and expressive attitudes toward built places since they must live and work in natural environments and travel to urban places for recreation. For similar reasons, an urban child may develop expressive attitudes toward nature and instrumental attitudes toward built places. In both cases, the gender of the child is not relevant but the residence and experience is important. It is not clear whether the relationship between these personality traits and environmental attitudes is more dependent on gender development or on other factors in the child's experience. However, if this model of environmental preference development is correct, the traditional family is nicely balanced such that the child can be educated by both parents in a complimentary fashion. Each child can then develop both natural and built preference, and their own bias towards instrumentality or expressiveness in each type of environment. Further research is needed to find support for this tentative explanation of differences in preference development.

## Methodology

Measures--From a methodological standpoint this exploratory study had some strengths and limitations. In comparison to previous research in environmental preference this study utilized measures that reflected facets of environmental attitude beyond preference and population size. Many of these attitude components were found to be excellent predictors of preference, in particular, environmental values and activity location. In addition, parental attitudes were found to have an important influence for child subjects. Assuming that experience with parental attitudes is a major factor in childhood experience it is surprising that childhood experience was not strongly predictive of adult preference. As mentioned previously, it is not clear why this is the case.

Previous research has often utilized the population size of the subject's residence to indicate familiarity with urban or rural environments. It is clear from this study that subjects are not accurate at estimating the population size of their residence but can be very

accurate in describing their living space, possibly a more useful way to detect residential influence on attitudes. For either measure type, residence was not found to be related to familiarity levels with different environment types. The sample as a whole indicated higher familiarity with natural environments than built despite the fact that the sample was balanced for rural and urban residence size and all subjects actually spent more time in built environments. Residence size, then, is not an equivalent or objective measure of environmental familiarity.

Procedure--The use of videos to present landscape scenes appeared to be successful and many subjects commented that the sounds had influenced their preference rating. It is suggested that in future studies of environmental preference, care is taken to consider other senses besides vision since sounds were found to have a powerful impact upon attitude. With regard to the measurement of environmental preference, it appears that responses to different types of environments do lie on a continuum as Driver and Greene (1971) have suggested. Both pilot and experimental subjects rated intermediate scenes exactly in between natural and built scenes, where natural scenes were highly preferred and built scenes were significantly less preferred. All of the scenes utilized in the study were rated highly for aesthetics by the pilot subjects and the amount of water, sound level, and depth of field was held constant across all scenes. Because the level of attractiveness and presentation characteristics were constant, it appears that the primary factor that influenced categorization of scenes by the pilot subjects and preference for scene types by the experimental subjects, was the amount of human influence apparent in the picture. However, further research is necessary on this point.

It is interesting that the child subjects also made a similar distinction between the three types of environments in their preference ratings. Therefore, at age 11 children are able to distinguish these categories and show differential preference for natural scenes over built. In contrast to Moore and Young's (1978) point that children have had minimal experience in natural settings, this study found that children do have considerable

experience and familiarity with natural environments according to parental report. Despite this familarity, children's preference for natural environments seems to be related more to parental preference and residence than familiarity with such places. It appears that further knowledge of children's experience and understanding of the environment is needed, particularly through longitudinal study of several family groups.

The study had its methodological limitations as well. Due to the exploratory nature of this study, several redundant measures were utilized that increased the risk of error in analysis. For example, time spent outdoors/ indoors proved to be a poor predictor of preference or values and is redundant with activity location in many ways. Residence was measured in several ways in search of the best measure of residence from the subject's perspective, but it is not clear at this point which measure was the most accurate or predictive. The survey question regarding activity location was often considered confusing to the adult subjects and needs to be restructured. Five different activites were listed by the subject, the amount of time per week spent in each activity was estimated, and the subject then rated the environmental location of the activity on a continuum from natural to built environment type. Several subjects found this question difficult when considering infrequent activities such as camping or skiing, and the confusion increased when they attempted to answer the question with regards to their own childhood. Further efforts to find the best survey method for leisure activities are needed.

The sample size was limited for the number of variables considered. It was extremely difficult to find intact middle-class families where both parents fulfilled the childhood and adulthood residential requirements, and had an eleven-year old child that was of the right sex to balance out the sample. Therefore, the sample was smaller than initial plans dictated and the power of the analyses was limited. Clearly the sample may be a biased representation of the general population since the subjects were middle-class, primarily white, from intact families, and living in Northern California. But these factors were controlled by the experimenter during subject selection in order to reduce the number

of factors under consideration. The sample may also be biased since participation in the experiment was on a voluntary basis and it may be that environmentally oriented families are the only ones interested in being involved in such a study. These biases do influence the general validity of this study and further research needs to be completed that considers these variables.

The dependence in this study upon parental report for children's environmental experience was reasonable but may have introduced error into the results. Eleven-year old children were assumed to have poorer estimation abilities than their parents for the amount of time spent doing particular activities and for familiarity with different types of environments. For example, if a child visited the ocean at age 5, this experience may influence their attitudes despite the fact that they do not remember this visit. This gap in memory may influence the response to survey questions about familiarity. Parents presumably have a better memory for such events. The child subjects were asked to list activities during the week and to estimate the amount of time spent in each activity as well as the location. Their answers were significantly different from their parents' and the reason for this is not clear. The children's answers often reflected only very recent activities and parents were much more able to include activities from previous years or other seasons. Parents on the other hand can introduce their own biases into the child's report. For example, if the child spent a great deal of time watching television, the child would often mention this as a frequent activity whereas the parent tended to ignore this activity. Presumably parents like to think that their children are active in sports or intellectual pursuits rather than television viewing, and their answers often reflected this bias. Such a bias was evident in the description of residence for the child, where parents would often describe the child's residence as more natural than their own residence. Again it is assumed that most parents prefer to believe that their child is growing up in a more rural setting than is actually the case. The conclusion here is that parental report is often necessary but also brings error into the analysis through personal bias. Perhaps the best

way to deal with this is in future studies would be to understand those aspects of a child's experience that parents tend to exaggerate or ignore.

Another problem apparent in this study is that all of the scenes presented were liked at various levels, none were strongly disliked. It is not clear how this problem might have influenced the results but perhaps more variation in preference would bring to light the influence that other environmental experiences have upon preference. The study should be repeated with an actual preference situation where natural scenes are provided along with built scenes and the subject must choose between the two. Perhaps the way that preference was measured in this study influenced the results and other methods need to be tested prior to any final conclusions.

Finally, it is disconcerting that familiarity was not related to preference in any way in this study. Considering the consistent results of Zajonc (1968, 1980) where familiarity and preference are positively correlated in many different experimental contexts, the results here are questionable. As was discussed previously, the contradictory results may be due to the method of measurement of familiarity in this study. Certainly the research literature on this relationship is very inconsistent, primarily because of different methodologies. However, it may also be that environments represent a different type of mental representation than the words and symbols utilized in the research of Zajonc. Future empirical work in this area should focus upon the different methods of obtaining preference and familiarity measures in order to clarify this matter.

## Model of Environmental Attitude Development

Although this study had a number of methodological limitations, it did show support for the model of environmental attitude development located in Figure 1. There was clear evidence that in current experience, environmental affect, beliefs, and behavior are all actively influencing each other and are reasonably consistent for different types of environments. For example, natural preference (environmental affect) is related to pastoral

values (environmental beliefs), showing a consistency for natural environment attitude expression. But the model also gained support when considering developmental experience and its influence upon current environmental attitudes. Compared with adults, children showed distinctly different relationships between attitude components, indicating that maturational factors, personality development, and experiential factors are important variables in current attitude expression. The fact that parents' preferences and values were related to children's values and preferences indicates that experiential factors and learning play a role in environmental attitude development. Indeed it appears that there is a socialization process for the physical environment that is partially dependent upon the parent and upon the child's personal experience as well.

The fact that adults current preferences and values were not related to childhood experience does not support the model. However, as mentioned previously, it may be that adults' memories for environmental experience in childhood is not accurately recalled on such surveys or it may be that the relevant childhood experiences were not considered in this study. Another possibility is that current environmental choices dictate current environmental attitudes more than childhood experience, so that as adults move farther into adult responsibilities of working and raising a family, their preferences and values no longer reflect childhood experience. This last point is harder to accept since many other types of adult attitudes seem to be connected to childhood experience (e.g., fascist attitudes (Adorno et al., 1950); persistence of democratic attitudes (Beck, 1977); prejudice (Epstein and Komorita, 1966); and political orientation (Jennings and Niemi, 1974)).

## Implications

World-wide, many individuals are wondering how to develop a universal sense of responsibility and value for all types of environments, in all cultures. Environmental designers and planners have a great responsibility in this drive to change environmental attitudes. According to the current study, individuals' attitudes are influenced by emotional

bonds and instrumental needs for each type of environment and these responses change across the lifespan. Children begin life with a more expressive response to environments and during adulthood the instrumental response becomes predominant. When adults focus on the instrumental goal of an environment, the attachment and protective response towards the environment may disappear. This loss of attachment and value can be devastating for natural environments as wilderness areas depend upon such protection. A weaker bond with urban places may lead to destructive behavior in the form of littering, vandalizing, and dumping of toxic waste. Designers can ensure that adults do not lose their emotional bond with the physical environment through careful attention to features that support emotional response while planning for the instrumental needs of the setting as well. In the past, society has easily measured a landscape for its instrumental value. But now the aesthetic and emotional value of a landscape needs to be designed for and protected, as well. For example, a work setting could be designed to achieve instrumental goals such as high task performance, good traffic flow, and increased communication but could at the same time achieve expressive goals by providing windows, allowing personalization of space using art, or landscaping with plants that carry particular emotional meanings such as roses, sunflowers, pine or palm trees. The same balance should be sought in natural areas where the visitor could not only directly experience his/her emotional response to the scene but could also learn about the importance of protecting that area for instrumental needs such as future water or resource needs, maintenance of species variability in plants and animals, or global climate control.

Although planners should seek a balance between instrumental and expressive goals for each environment, it is clear that natural environments more easily fulfill expressive needs and built environments readily support instrumental needs. Unfortunately, natural environments have not always been measured by and protected for their emotional value and many built environments are extremely rigid in their design such that the joy of "manipulating" or influencing such an environment is blocked. Each type of environment

should be valued for what it can easily offer. If changes in that environment must occur, great care should be taken to achieve a balance between instrumental and expressive goals.

The age differences in environmental attitude indicated in this study suggest that policies and design involving children should revolve around children's needs and desires. Design that is developed by adults without contact with the younger user is denying the differences that are evident in this study and previous studies. Instrumental and expressive goals will be different between children and adults due to cognitive, emotional, social and physical differences. Children have a strong interest in the physical environment and it appears that childhood may be a "sensitive period" for developing place attachment and environmental empathy. Designers again have a responsibility to attend to the balance of goals for each environment, if they wish to influence the attitudes of the next generation. For example, if a playground includes conservative steel equipment and pavement surfaces, the design denies the importance of emotional attachment and manipulability as well. Adventure playgrounds with mounds of dirt, natural wood equipment, and flowing water allow for manipulation and control by the child leading to a stronger emotional bond with nature as well. Again, balance in the design could be very influential in attitude development.

Parental values were shown to be of great significance in a child's view of the physical world. This implies that parents have the power, as well as designers, to change environmental attitudes of the future. It appears that the child's own direct experience in different environments has less influence on attitude development than the values espoused by both parents. In particular, the balance between each parent's value for and expression of instrumentality and expressivity appears to be important in the family situation. The results indicated that the mother more often influences the child's expressive response to environments while the father influences the instrumental response, such that each parent compliments the other as a role-model for the child. Each individual child has a specific set of environmental responses based on parental influence, so that siblings vary even

within the same family. Such variability is a good quality. However, the balance between the two types of response is fragile and can be disturbed if one parent influences the child more than the other or when there is only one parent or no parent available as a model. When the balance is disturbed in these ways, the child may develop a weaker bond with a specific environment type which may lead to lower motivation to protect such an environment, or perhaps lead to destructive behavior. Therefore, the goal for both fathers and mothers should be to provide multiple opportunities for the child to learn the value of expressing emotionality and instrumentality toward all types of environments. If it is true that children are strongly connected to the physical environment, particularly natural places, then parents should consider childhood to be a sensitive period for developing environmental attachment and ultimately environmental ethics. Through their expression of values and recreational activities, preferences and environmental use, parents can influence a new generation of environmentalists who value and protect both natural and urban spaces.

## Conclusion

Despite support for the model, this study leaves many questions unanswered. For example, what is happening in development prior to age eleven and do parental attitudes influence the child past the age of eleven? How do children distinguish between natural and built environments and when does this ability to categorize environments begin? Are these results similar cross-culturally or merely specific to middle-class Americans?

The next set of questions needs to consider the process of attitude development. How are environmental attitudes learned from parents? Is it a process of social learning and/or is it dependent upon cognitive development? And how does temperament of the child play a role in the learning process? It is apparent from the results of this study that in order to answer questions such as these, future studies should focus on three factors that interact with environmental attitude development--aesthetic temperament, empathy, and

personality traits. Aesthetic temperament refers to the innate ability to appreciate beauty through the senses that is present at birth and influenced by learning. For example, an auditory aesthetic temperamental style may produce a child who appreciates a harmonius melody or the sounds of flowing water. A gustatory aesthetic temperament style may produce a child who appreciates good food, sugary desserts or the "beauty" of a fine wine. In the current study, there was evidence that visual preferences run in families and perhaps each child is born with a different visual aesthetic style that can be considered temperament. Indeed, the significant correlations in this study between children's preference for all three types of environments support this point. Those children who appreciate the beauty of one type of environment appreciate the beauty of all types of environments. Those who do not prefer natural environments, also do not prefer intermediate or built environments.

During interactions with the families, it was clear that some families were focused upon visual aesthetics and beauty more than other families. The cause of these differences is unclear but the process may depend on a complex interaction between genetic predispositions such as temperamental style and experiential factors such as social learning in the family. Therefore future research first, needs to clarify the existence of such aesthetic temperaments and second, determine the influence of temperament upon environmental attitudes. It may be that certain individuals will never appreciate the beauty of a visual landscape despite a variety of childhood experiences, whereas other individuals can appreciate the beauty of all types of environments despite a limited amount of learning from parents or other social forces. This point leads us back to the nature/nurture issue discussed previously. Lehrman (1970) has suggested that the emphasis in developmental research should be placed upon the interaction between the environment and the organism at various stages of development. The child should be seen as an active participant in development, altering his/her environmental attitudes as they develop during learning about the physical properties of the habitat. Therefore, whether preference is ultimately innate based on aesthetic temperament or learned is less important than the understanding of the

maturational process of preference throughout the lifespan. Clearly, for the 11-year old child, environmental attitudes have been strongly influenced by the family. The origins of that influence, temperament or social learning factors, are still unclear.

It is also apparent from this study that the development of empathy may influence the development of environmental attitudes. Perhaps children value environments in a maturational sequence that follows the development of the ability to take another's perspective and to feel responsible for others. Kellert's (1983) research discussed previously, showed that children develop empathy for animals across childhood in a predictable fashion and that the empathy is expressed in different ways by different age groups. For the development of empathy for environments, it is clear that children must first learn that the physical environment is separate from themselves in order to value it in its own right. They must also learn that there are different types of environments and that each type of environment is used for different purposes. In order to feel a sense of responsibility for the environment, children must develop moral reasoning that respects other perspectives besides their own and understand that their behavior can influence the environment. These are all examples of how the development of empathy and environmental attitude go hand in hand.

In the current study, there was evidence that children's value for the environment is influenced by parental values, particularly the mother's values. In the empathy literature it is clear that both parents can influence empathy development in the child, but in traditional families the mother plays a particularly important role since she is the primary role model for caregiving behaviors in the traditional family setting (Eisenberg-Berg & Mussen, 1978; Feshbach, 1975; Strayer, 1983). Therefore, when environmental values are influenced primarily by the mother and those values tend to involve a sense of responsibility for environments and taking the perspective of other beings, it appears that one important process in environmental empathy development may be the role-modeling provided by the mother. As fathers become more involved in the caretaking of their children, the influence

of their environmental empathy may become apparent as well. During interaction with the various families in the study it appeared that families differed in their values for the physical environment and their sense of responsibility for protecting the environment. It would make sense that such attitudes would be dependent upon social learning but also the temperament styles mentioned previously. If one does not appreciate the beauty of something, it is difficult to learn to value and protect that object, being, or place. So empathy and temperament may interact to produce an individual that cares about protecting the environment or produce an individual who does not take responsibility for the physical environment.

Finally, it may be that the personality traits mentioned previously--instrumental and agency or expressiveness and communion--play a large role in environmental attitude development. The development of these traits may influence preferences toward natural and built environments as discussed. Again it may be that the purpose of an environment or what it affords that is incorporated into the individual's attitude such that for each environment the person responds in either an instrumental-agentic or expressive-communal manner. For example, if a person recreates in natural places or goes to natural places to restore spiritual balance but works and toils in built environments, the individual may show an expressive response to nature and an instrumental response to built places. This would explain why urban residents often show a strong emotional bond with nature while continuing to live in urban areas and spending large amounts of money to protect such areas that they don't even use. But if an individual works in natural places and recreates in urban places, that person may show an instrumental response to natural places and an expressive response to built places. There are anecdotal accounts of loggers and farmers who have a strong utilitarian attitude towards nature and lack an expressive response to natural places. Indeed, this difference in instrumental and expressive trait expression may be the bottom line for famous conflicts such as the "Spotted owl" conflict between urban residents and loggers or the "Snail darter" problem in Tennessee between engineers, the

government, and environmentalists. The point here is that during environmental attitude development, traits may develop in response to specific types of environments and their purpose in daily living. These traits will be influenced by experience in environments, by parental response, and by aesthetic temperament and empathy development as well. All of these factors, then, influence current environmental attitude expression in each individual. Clearly environmental attitude development is a complex process that deserves much attention in future environmental research.

In conclusion, environmental attitudes are influenced by direct experiences in the environment but also by parental attitudes. As children mature their attitude expression appears to change from an idealistic or expressive approach to a more realistic or instrumental approach to environments. Adult attitudes are much more influenced by current needs and responsibilities whereas children's attitudes are influenced by their parents and emotional responses to personal environmental experience. Environmental attitudes are expressed differently for natural and built environments, and it appears that the developmental process for natural environment attitudes differs from built environment attitudes. The two processes are possibly governed by gender development and sex differences in parental role model, such that the father's behavior influences one attitude type and the mother's values influence another attitude type. The two processes may also mature in conjunction with aesthetic temperament, empathy, and personality traits. Therefore, the development of environmental attitude is dependent upon a complex interaction of maturational, genetic, experiential, and personality factors. The current study is merely the beginning of a search for the headwaters of the attitudes that influence our daily environmental choices, our emotional responses to physical surroundings and our sense of responsibility for the precious natural and built environments that support our survival and bring joy to all. And the river is wide.....

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TABLE 1. Dimensions of Environmental Response Inventory (McKechnie, 1974)

1. Pastoralism

   Positive responsiveness to natural environments, outdoors and open spaces.

2. Urbanism

   Broad attraction to the human-made environment and to the complexity and diversity of city living.

3. Environmental Adaptation

   An optimistic lack of concern about human intervention in the natural environment along with a belief in the right of humans to use technology to adapt and dominate nature.

4. Stimulus Seeking

   An affinity for increased activation via stimulation from the environment and an attraction to unusual and adventurous environmental settings.

5. Environmental Trust

   A sense of confidence and trust in all types of environments, both human-made and natural.

6. Antiquarianism

   Emotional responsiveness to the historical past and to old-fashioned or traditional environmental design.

7. Need Privacy

   A positive appreciation of solitude and the need to be free from distraction from the external environment.

8. Mechanical Orientation

   An attraction to mechanized structures and the enjoyment of manual activity.

TABLE 2. Sample Residence Categories

Current Family Residence

(Number of families)

| | | RURAL | URBAN | |
|---|---|---|---|---|
| Adult Subjects | RURAL | 9 | 5 | N= 14 families |
| Childhood Residence | URBAN | 8 | 10 | N= 18 families |
| | | N=17 families | N=15 families | Total= 32 |

TABLE 3. Mean Natural, Intermediate, and Built Preference Ratings of Adults Currently Residing in Four Different Population Sizes

| Population Size | Environmental Preference Category: Natural Preference | Intermediate Preference | Built Preference |
|---|---|---|---|
| (<5,000) | 6.32 | 5.58 | 4.20 |
| (5-25,000) | 6.53 | 5.52 | 3.98 |
| (50-100,000) | 6.33 | 5.35 | 4.22 |
| (>100,000) | 6.07 | 5.02 | 3.97 |

Trend $p < .08$ * $p < .04$

Note.Preference ratings are based on a 7 point scale from 1(Dislike very much) to 7(Like very much).

TABLE 4. Mean Natural, Intermediate, and Built Preference Ratings of Adults Currently Residing in Rural and Urban Areas using Population Mean Scores

| | | Environmental Preference Category | | |
|---|---|---|---|---|
| | | Natural Preference | Intermediate Preference | Built Preference |
| Residence Category | RURAL | 6.44 | 5.55 | 4.08 |
| | URBAN | 6.17 | 5.14 | 4.06 |
| | | * $p < .04$ | * $p < .02$ | |

Note. Preference ratings are based on a 7 point scale from 1(Dislike very much) to 7(Like very much)

TABLE 5. Mean Natural, Intermediate, and Built Preferences of Adults Currently Residing in Rural, Suburban, and Urban Areas using Residence Description Scores

| | | Environmental Preference Categories | | |
|---|---|---|---|---|
| | | Natural Preference | Intermediate Preference | Built Preference |
| Residence Category | RURAL | 6.37 | 5.31 | 4.08 |
| | SUBURBAN | 6.52 | 5.53 | 4.21 |
| | URBAN | 6.08 | 5.11 | 4.09 |

* $p < .01$

Note.Preference ratings are based on a 7 point scale from 1(Dislike very much) to 7(Like very much).

TABLE 6. Mean Natural, Intermediate, and Built Preference Ratings of Adults Residing in Rural, Suburban, and Urban Areas during Childhood using Residence Description Scores

| | | Environmental Preference Categories | | |
|---|---|---|---|---|
| | | Natural Preference | Intermediate Preference | Built Preference |
| Childhood Residence Category | RURAL | 6.49 | 5.76 | 4.38 |
| | SUBURBAN | 6.26 | 5.16 | 3.94 |
| | URBAN | 6.20 | 5.24 | 4.42 |

* $p < .01$ Trend $p < .06$

Note.Preference ratings are based on a 7 point scale from 1(Dislike very much) to 7(Like very much).

TABLE 7. Mean Natural, Intermediate, and Built Preference Ratings of Children Currently Residing in Rural, Suburban, and Urban Areas using Residence Description Scores

| | | Environmental Preference Categories | | |
|---|---|---|---|---|
| | | Natural Preference | Intermediate Preference | Built Preference |
| Child's Residence Category | RURAL | 6.00 | 5.03 | 3.74 |
| | SUBURBAN | 6.18 | 5.00 | 4.44 |
| | URBAN | 6.15 | 5.21 | 4.70 |

Trend $p < .06$

TABLE 8.Statistically Significant Correlations between Adult Preferences and Attitudinal Measures

| | | | |
|---|---|---|---|
| Natural Preference | to | Intermediate Preference | r = .60 |
| | to | Pastoralism | r = .36 |
| Intermediate Preference | to | Built Preference | r = .59 |
| | to | Adult Residence (Pop.) | r = -.34 |
| Built Preference | to | Intermediate Preference | r = .59 |
| | to | Adult Activity Location | r = .31 |

* $p < .05$ for all

TABLE 9. Statistically Significant Correlations between Child Preferences and Attitudinal Measures

| | | | |
|---|---|---|---|
| Natural Preference | to | Intermediate Preference | r = .84 |
| | to | Built Preference | r = .40 |
| | to | Pastoralism | r = .64 |
| | to | Parental Natural Pref | r = .36 |
| | to | Mother's Natural Pref | r = .50 |
| Intermediate Preference | to | Natural Preference | r = .84 |
| | to | Built Preference | r = .53 |
| | to | Pastoralism | r = .64 |
| Built Preference | to | Natural Preference | r = .40 |
| | to | Intermediate Preference | r = .53 |
| | to | Residence(Description) | r = .35 |
| | to | Residence(Pop. 6-11) | r = .38 |
| | to | Activity Location | r = .34 |
| | to | Urbanism | r = .56 |

* $p < .05$ for all

TABLE 10. Stepwise Regression Statistics for Adult Natural, Intermediate, and Built Preference

| Preference | Predictor | Adjusted R-Sq | Beta Weight | p |
|---|---|---|---|---|
| Natural | Pastoralism | .12 | + .364 | .007 |
| Intermediate | Residence-Pop | .12 | - .362 | .007 |
| Built | Adult Activity | .09 | + .322 | .018 |

TABLE 11. Stepwise Regression Statistics for Children's Natural, Intermediate and Built Preference

| Preference | Predictor | Adjusted R-Sq | Beta Weight | p |
|---|---|---|---|---|
| Natural | Pastoralism | .48 | + .709 | .001 |
| Intermediate | Pastoralism | .40 | + .647 | .001 |
| | Intermediate Familiarity | .47 | - .300 | .001 |
| | Urbanism | .54 | +.317 | .001 |
| Built | Urbanism | .34 | + .606 | .001 |
| | Pastoralism | .49 | +.447 | .001 |

TABLE 12. Stepwise Regression Statistics for Children's Preference--Parental Predictors

| Preference | Predictor | Adjusted R-Sq | Beta Weight | p |
|---|---|---|---|---|
| Natural | Parental Natural Pref. | .18 | + .466 | .016 |
| | Parental Residence-Pop | .34 | +.427 | .003 |
| Intermediate | Father Activity | .11 | +.373 | .042 |
| Built | Father Built Familiarity in Childhood | .13 | +.400 | .029 |

TABLE 13. Stepwise Regression Statistics for Adult Values--Pastoralism and Urbanism

| Disposition | Predictor | Adjusted R-Sq | Beta Weight | p |
|---|---|---|---|---|
| Pastoralism | Natural Pref. | .11 | + .359 | .007 |
| | Built Pref. | .25 | - .404 | .001 |
| Urbanism | Adult Built Familiarity | .12 | +.374 | .005 |
| | Childhood Natural Familiarity | .19 | - .287 | .002 |
| | Childhood Built Familiarity | .24 | + .277 | .001 |

TABLE 14. Stepwise Regression Statistics for Children's Values--Pastoralism and Urbanism

| Disposition | Predictor | Adjusted R-Sq | Beta Weight | p |
|---|---|---|---|---|
| Pastoralism | Natural Preference | .48 | + .709 | .001 |
| | Residence (Description) | .56 | - .298 | .001 |
| Urbanism | Built Preference | .34 | +.606 | .001 |
| | Natural Preference | .55 | - .504 | .001 |
| | Activity Location | .62 | + .282 | .001 |

TABLE 15. Stepwise Regression Statistics for Children's Values--Parental Predictors

| Disposition | Predictors | Adjusted R-Sq | Beta Weight | p |
|---|---|---|---|---|
| Pastoralism | Parental Natural Pref. | Equation 1 .20 | +.484 | .012 |
| | Mother's Natural Pref. | Equation 2 .21 | + .491 | .009 |
| Urbanism | Parental Urbanism | Equation 1 .13 | + .401 | .042 |
| | Mother's Pastoralism | Equation 2 .16 | - .442 | .021 |
| | Mother's Urbanism | Equation 2 .28 | + .373 | .008 |

FIGURE 1. Model of Environmental Attitude Development

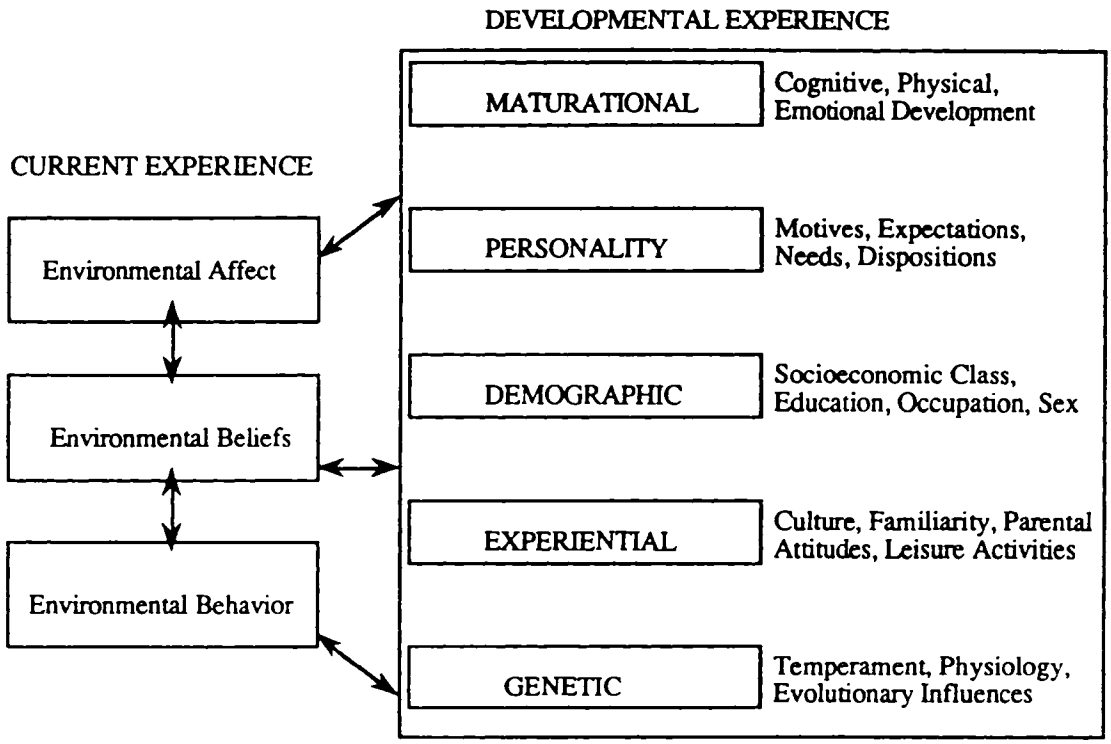


FIGURE 2. Self-Defined Childhood Residence for 4 Life Periods

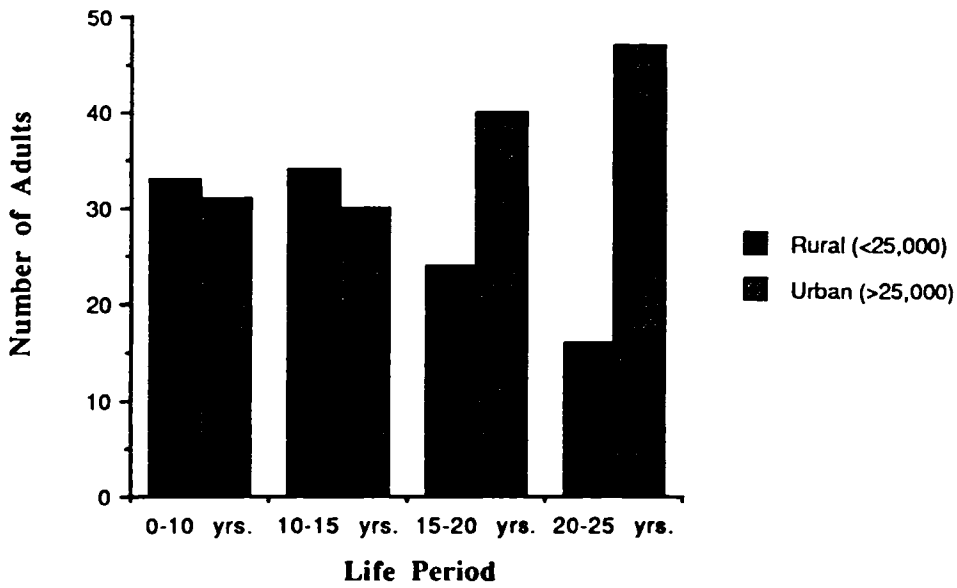


FIGURE 3. Percentage of Time Spent Outdoors-Adult and Child Subjects

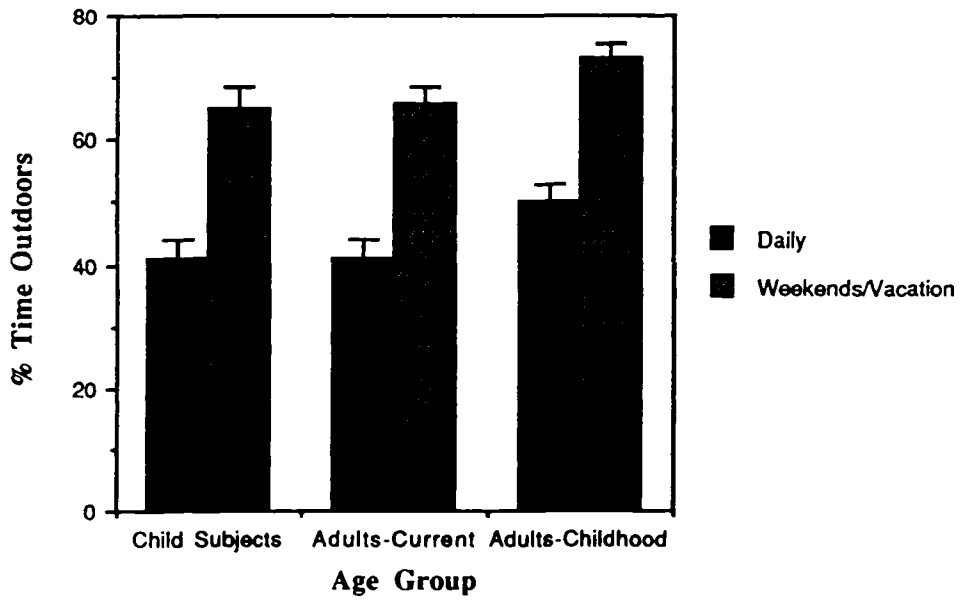


FIGURE 4. Location of Recreational Activities-Adult and Child Subjects

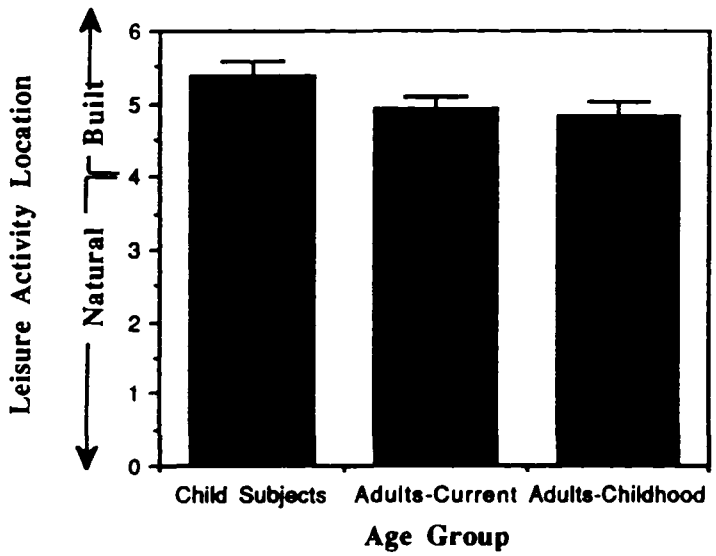


FIGURE 5. Familiarity Levels for Natural, Intermediate, and Built Environments-All Subjects

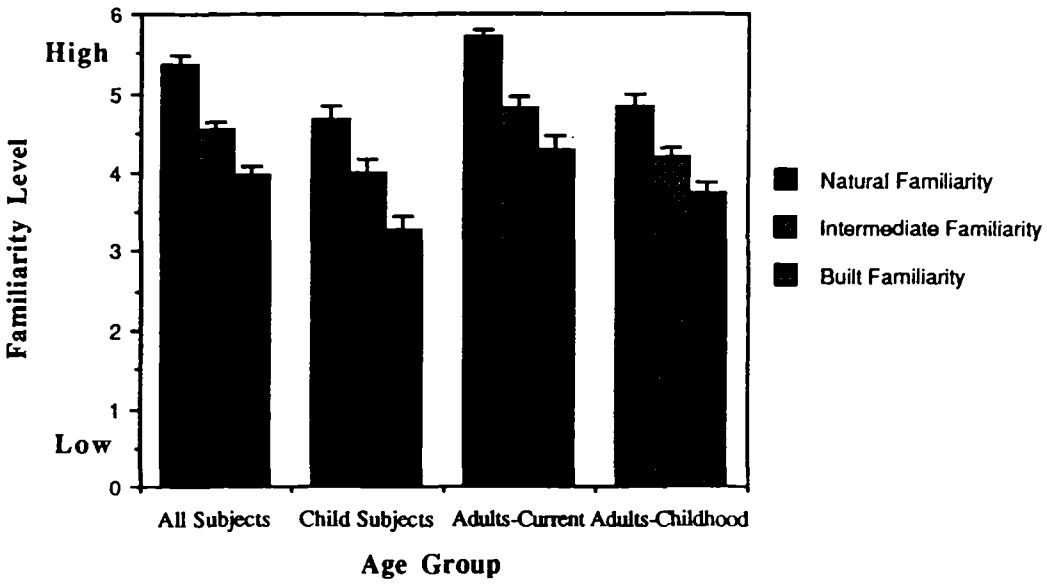


FIGURE 6. Pastoralism and Urbanism Values Scores--All Subjects

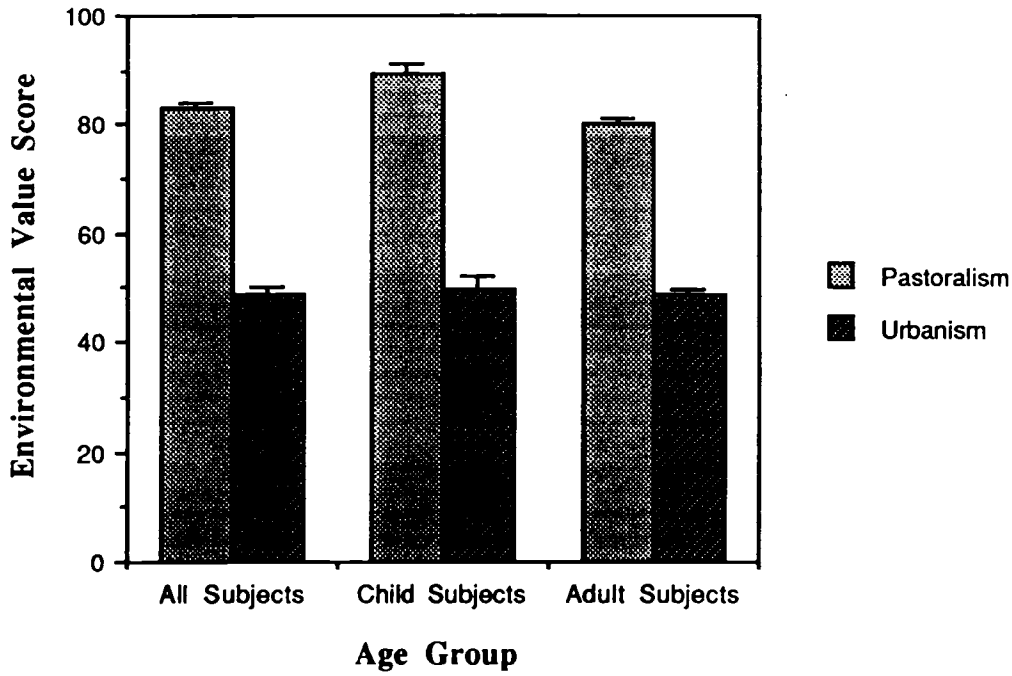
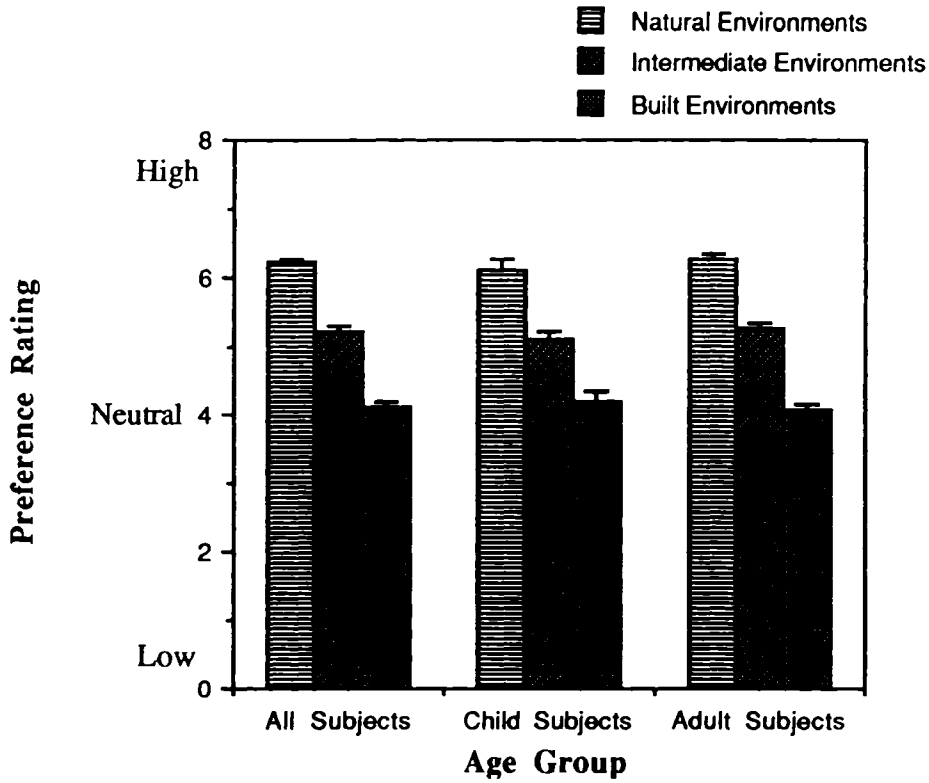


FIGURE 7. Preferences for Natural, Intermediate, Built Environments--All Subjects



# APPENDIX 1. ENVIRONMENTAL BEHAVIOR QUESTIONNAIRE

This questionnaire is concerned with where you resided and spent your leisure time during your childhood, where you currently reside and spend your leisure time, and where your child spends leisure time. The following definitions are provided to assist you in understanding the terms used in the questionnaire.

Leisure Time

This is time when you are not involved with work related activities, time that is spent doing sports, hobbies or simply relaxing.

Natural Environments

Environments with minimal or no apparent human impact, such as the ocean, the redwood forest or the desert.

Intermediate Environments

Environments with some apparent human impact, such as farmland or lakeside campgrounds.

Built Environments

Environments with much apparent human impact, such as the shopping mall, office parks and your home.

Number Of Child _____

Number of Parent _____

## A. YOUR CHILDHOOD

1. How would you describe the population where you spent the most time, while growing up? (Place a checkmark ( ) in one population size for each age range).

| | Population Size | | | |
|---|---|---|---|---|
| Age | 0-5,000 | 5,000-25,000 | 25,000-100,000 | 100,000 & above |
| 0 to 10 years | | | | |
| 10 to 15 years | | | | |
| 15 to 20 years | | | | |
| 20 to 25 years | | | | |

2. Please describe, in your own words, the area where you lived most of the time while growing up. Focus on the natural, intermediate or built qualities of the area, for example, "I lived in an apartment building and played in the street", "I lived in a suburban area with lots of trees", etc.

3. Recreational activities that you did as a child:

3a. List the five most **frequent** activities you did as a child during leisure time (playing soccer, playing piano, reading, hiking, biking, going to museums, making jewelry). Please be specific (e.g. use "played soccer" instead of "played organized sports").
Indicate how many hours per week you engaged in that activity.

| | Activity | Number of hours per week | Environment Rating (see below) |
|---|---|---|---|
| a. | _____ | _____ | _____ |
| b. | _____ | _____ | _____ |
| c. | _____ | _____ | _____ |
| d. | _____ | _____ | _____ |
| e. | _____ | _____ | _____ |

Then please indicate where you would place the environment where you did these activities on the following continous scale. The scale ranges from natural environments (e.g. forest) to intermediate environments (e.g. farmland) to built environments (e.g. shopping mall).

Natural — Intermediate — Built

1 2 3 4 5 6 7

3b. As a child how much of your total leisure time did you spend outdoors and indoors? (Give a percentage score, so that if you spent most of the time outdoors and only a little time indoors, then you might use 70% for outdoors and 30% for indoors). Make the two percentages total up to 100%.

| Daily | | Weekend/Vacation | |
|---|---|---|---|
| _____ | Indoors | _____ | Indoors |
| + _____ | Outdoors | + _____ | Outdoors |
| = 100% | | =100% | |

4. Please rate how familiar you consider yourself, as a child, to have been with the following places. Please use the rating scale below.

| Not at all familiar | | | Moderately familiar | | | Very familiar |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| Location | Familiarity Rating | Location | Familiarity Rating |
|---|---|---|---|
| a. Seacoast | _____ | p. Vegetable Gardens | _____ |
| b. Mountains | _____ | q. Shopping Malls | _____ |
| c. Creeks | _____ | r. City streets | _____ |
| d. Lakes | _____ | s. Auditoriums | _____ |
| e. Rocky areas | _____ | t. Skyscrapers | _____ |
| f. Oak Tree Stands | _____ | u. Train Stations | _____ |
| g. Forests | _____ | v. Bridges | _____ |
| h. Sunsets | _____ | w. Courtyards | _____ |
| i. Desert | _____ | x. Houses | _____ |
| j. Meadow-Farmland | _____ | y. Vineyards | _____ |
| k. Dry-Farmland | _____ | z. Ranches/Cabins | _____ |
| l. Flowerbeds | _____ | | |
| m. Parks | _____ | | |
| n. Fountains | _____ | | |
| o. City plazas | _____ | | |

5. Using the rating scale above, indicate how familiar you consider yourself to have been **as a child** :

| | Rating |
|---|---|
| with natural environments | _____ |
| with intermediate environments | _____ |
| with built environments | _____ |

## B. YOUR CURRENT ACTIVITIES AS AN ADULT

6. How would you describe the population size where you have lived most of the time as an adult?

0-5,000 _____
5,000-25,000 _____
25,000-100,000 _____
100,000 & above _____

7. Please describe, in your own words, the area where you have lived most of the time as an adult. (Follow the directions for question #2).

8. Recreational activities that you do as an adult:

8a. List the five most frequent activities you do as an adult during leisure time. Please be specific. Indicate how many hours per week you engage in each activity.

| | Activity | Number of hours per week | Environment Rating (see below) |
|---|---|---|---|
| a. | | | |
| b. | | | |
| c. | | | |
| d. | | | |
| e. | | | |

Then please indicate where you would place the environment where you do these activities on the following continous scale.

Natural _____ Intermediate _____ Built

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

8b. As an adult how much of your total leisure time do you spend outdoors and indoors? Make the two percentages total up to 100%.

| Daily | | Weekend/Vacation | |
|---|---|---|---|
| _____ | Indoors | _____ | Indoors |
| + _____ | Outdoors | + _____ | Outdoors |
| = 100% | | =100% | |

9. Please rate how familiar you consider yourself, as an adult, to be with the following places. Please use the rating scale below.

| Not at all familiar | | | Moderately familiar | | | Very familiar |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| Location | Familiarity Rating | Location | Familiarity Rating |
|---|---|---|---|
| a. Seacoast | _____ | p. Vegetable Gardens | _____ |
| b. Mountains | _____ | q. Shopping Malls | _____ |
| c. Creeks | _____ | r. City streets | _____ |
| d. Lakes | _____ | s. Auditoriums | _____ |
| e. Rocky areas | _____ | t. Skyscrapers | _____ |
| f. Oak Tree Stands | _____ | u. Train Stations | _____ |
| g. Forests | _____ | v. Bridges | _____ |
| h. Sunsets | _____ | w. Courtyards | _____ |
| i. Desert | _____ | x. Houses | _____ |
| j. Meadow-Farmland | _____ | y. Vineyards | _____ |
| k. Dry-Farmland | _____ | z. Ranches/Cabins | _____ |
| l. Flowerbeds | _____ | | |
| m. Parks | _____ | | |
| n. Fountains | _____ | | |
| o. City plazas | _____ | | |

10. Using the rating scale from the previous page, indicate how familiar you consider yourself to be **as an adult**:

| | Rating |
|---|---|
| with natural environments | _____ |
| with intermediate environments | _____ |
| with built environments | _____ |

## C. YOUR CHILD

11. How would you describe the area where your child has lived most of the time, while growing up? (Place a checkmark in one population size for each age range.)

| | Population Size | | | |
|---|---|---|---|---|
| Age | 0-5,000 | 5,000-25,000 | 25,000-100,000 | 100,000 & above |
| 0 to 5 years | | | | |
| 5 to 11 years | | | | |

12. Please describe, in your own words, the area where your child has lived most of the time while growing up. (Follow directions for #2).

13. Recreational activities that your child is involved with:

13a. List the five most frequent activities your child does during leisure time. Please be specific. Indicate how many hours per week he/she engages in that activity and where you would place the environment where each of these activities occurs on the scale given below.

| | Activity | Number of hours per week | Environment Rating (see below) |
|---|---|---|---|
| a. | _____ | _____ | _____ |
| b. | _____ | _____ | _____ |
| c. | _____ | _____ | _____ |
| d. | _____ | _____ | _____ |
| e. | _____ | _____ | _____ |

Natural ——— Intermediate ——— Built

1 2 3 4 5 6 7

13b. How much of your child's total leisure time is spent outdoors and indoors? Make the two percentages total up to 100%.

| Daily | | Weekend/Vacation | |
|---|---|---|---|
| _____ | Indoors | _____ | Indoors |
| + _____ | Outdoors | + _____ | Outdoors |
| = 100% | | =100% | |

14. Please rate how familiar you consider your child to be with the following places. Please use the rating scale below.

| Not at all familiar | | | Moderately familiar | | | Very familiar |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| Location | Familiarity Rating | Location | Familiarity Rating |
|---|---|---|---|
| a. Seacoast | _____ | p. Vegetable Gardens | _____ |
| b. Mountains | _____ | q. Shopping Malls | _____ |
| c. Creeks | _____ | r. City streets | _____ |
| d. Lakes | _____ | s. Auditoriums | _____ |
| e. Rocky areas | _____ | t. Skyscrapers | _____ |
| f. Oak Tree Stands | _____ | u. Train Stations | _____ |
| g. Forests | _____ | v. Bridges | _____ |
| h. Sunsets | _____ | w. Courtyards | _____ |
| i. Desert | _____ | x. Houses | _____ |
| j. Meadow-Farmland | _____ | y. Vineyards | _____ |
| k. Dry-Farmland | _____ | z. Ranches/Cabins | _____ |
| l. Flowerbeds | _____ | | |
| m. Parks | _____ | | |
| n. Fountains | _____ | | |
| o. City plazas | _____ | | |

15. Using the rating scale above, indicate how familiar you consider your child to be:

| Rating | |
|---|---|
| with natural environments | _____ |
| with intermediate environments | _____ |
| with built environments | _____ |

**THE END!!**