UNDERSTANDING VISUAL PREFERENCES FOR LANDSCAPES: AN EXAMINATION OF THE RELATIONSHIP BETWEEN AESTHETICS AND EMOTIONAL BONDING

A Dissertation

by

CHIA-KUEN CHENG

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2007

Major Subject: Recreation, Park and Tourism Sciences

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Approved by:

Chair of Committee,	C. Scott Shafer
Committee Members,	Joseph T. O'Leary
	David Scott
	Gerard Kyle
	James F. McNamara
Head of Department,	Joseph T. O'Leary

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ABSTRACT

Understanding Visual Preferences for Landscapes: An Examination of the Relationship Between Aesthetics and Emotional Bonding. (May 2007)

Chia-Kuen Cheng, B.S.; M.S., National Taiwan University

Chair of Advisory Committee: Dr. C. Scott Shafer

The relationship between humans and the quality of the environment have been examined primarily through two conceptual constructs: landscape aesthetics and place attachment or emotional place bonding. The former focuses on the physical environment and the latter focuses on the emotional or symbolic environment. This study focused on understanding the relationship between the two constructs, and provided a framework to integrate them toward a more comprehensive visual preference for landscapes. Nasar's (1989) symbolic model was used as a guiding concept in the study.

A web-based survey was used to collect people's responses to landscapes portrayed in photographs. Four primary measures were used in the survey: landscape aesthetic, typicality (to a national park), emotional place bonding, and landscape visual preference. To further examine the effect of place meaning on responses to landscapes, respondents were told during the survey that landscape pictures were taken from different places, which were assigned randomly as place labels (national park, commercial recreation area, local park, and scenic area).

Results indicated that emotional place bonding was significantly and positively influenced by perceived landscape aesthetics through four components: complexity,

mystery, coherence, and legibility. Complexity and mystery had more influence on emotional place bonding than the other two components. Results also provided empirical support for Nasar's (1989) symbolic model. The effect of landscape aesthetics on landscape visual preference was partially mediated by typicality and emotional place bonding. The typicality of a scene to a national park was found to positively influence people's emotional bonding to the place. The four randomly assigned place labels did not elicit significantly different preferences or emotional responses to the places.

This study documented how landscape aesthetics and emotional bonding can be integrated into visual preferences for landscapes. Results also provided evidence for the potential to use emotional bonding information to manage physical landscapes. The study contributes to our understanding and can assist with environment planning and management. Both physical appearance and symbolic/emotional meaning are very important to human perceptions of landscapes, and other attempts should be made to understand how the two constructs contribute to visual preference in future research.

To my parents

ACKNOWLEDGEMENTS

This process was one of the most challenging projects in my life, and I would like to express my gratitude and appreciation to many people who have contributed to the formation and completion of this dissertation. First, I would like to thank Dr. Joseph T. O'Leary for his continuous support and advice throughout my graduate program. It is he who helped me started the process. I am grateful for the time and effort spent on me from my committee members, Dr. David Scott, Dr. Gerard Kyle, and Dr. James F. McNamara. I am fortunate to have the support of all these talented individuals throughout my graduate program. I am most indebted to my chairperson, Dr. Shafer, not only for his faith in my ability, but also for his unbelievable patience editing the drafts. His encouragement and support will never be forgotten.

Special thanks go to Dr. Thomas Woodfin and Carter A. Hunt for helping me with my survey. I am also grateful to many fellow graduate students at RPTS and friends: Dr. Hyunggon Kim, Dr. Sangkwon Lee, Dr. Robert Li, Marcos Borges, Yuching Huang, Kam Hung, Jin-Hee Jun, Po-Hsin Lai, Yoon-Jung Oh, Yung-Ping Tseng and many others, for their consistent support and friendship. Additional thanks to the Department and all the staff for supporting me and making me feel at home for all these years.

Finally, I would like to express my heart-felt thanks to my wife, Li Shen, and to our families, for their kind support for my doctoral education. Most of all, my wife has been there for me always whenever I needed her. Without her dedication, understanding and sacrifice, I would not have been able to finish the dissertation.

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CHAPTER I
INTRODUCTION

There are two primary lines of research that have addressed people's perceptions of the quality of their environment (Jones, Patterson, & Hammitt, 2000). The first has examined what might best be described as landscape aesthetics (often termed landscape preference), which has focused on how individuals evaluate the physical environment. The second line of research has focused on the emotional bonds with landscapes that are acquired through direct experience, including social interactions in particular places. Although there are studies that suggest relationships between these two constructs (e.g. Jones et al., 2000; Kaltenborn & Emmelin, 1993), it is not clear that the two are related in any useful way, or whether they are instead two different and distinct ways of understanding the influence of places in peoples' lives. A better understanding of the relationship between the two concepts can contribute to the approaches that have been used to examine landscapes and to our understanding of how to plan, design and manage for the meanings that places hold for people.

When previous research has examined the physical elements of landscape, it has included attributes of the environment like form, line, color, and texture and more concrete elements like trees, water, mountains, or sky. On the other hand, emotional/symbolic elements have been considered intangibles that people associate with the environment and which develop through direct experience or interaction; e.g.,

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This dissertation follows the style of *Environment and Behavior*.

landscape attachment (Lowenthal, 1978) or the 'Genius Loci (spirit of place)' (Bell, 2004; Sime, 1995). Many researchers (e.g. Lang, 1987; Nasar, 1997; Porteous, 1996; Rapoport, 1977) have suggested that the landscape aesthetic and the emotional/symbolic approaches to be combined to form a more holistic approach to understanding visual preference for a landscape. Berleant (1997) suggested that landscape visual preference should be "measured less from formal (physical) traits than by perceptual immediacy and intensity in enhancing the intimate bond of person and place" (p.36). Given the unclear relationship between landscape preference and emotional bonding, the basic premise of this study will be that emotional bonds to a place and its landscape aesthetic both contribute to a person's visual preference for a place/landscape (see Figure 1.1). The central question of this research is: What contributes to a person's visual preference for a landscape? The purpose of the study will be to add information useful in developing a model of how visual preferences for landscapes are formed. This will be done by examining how the physical landscape (e.g., mountains, water, vegetation, buildings) and emotions (e.g., bonding/feelings based on past experiences with family), combine to create preferences for landscapes.

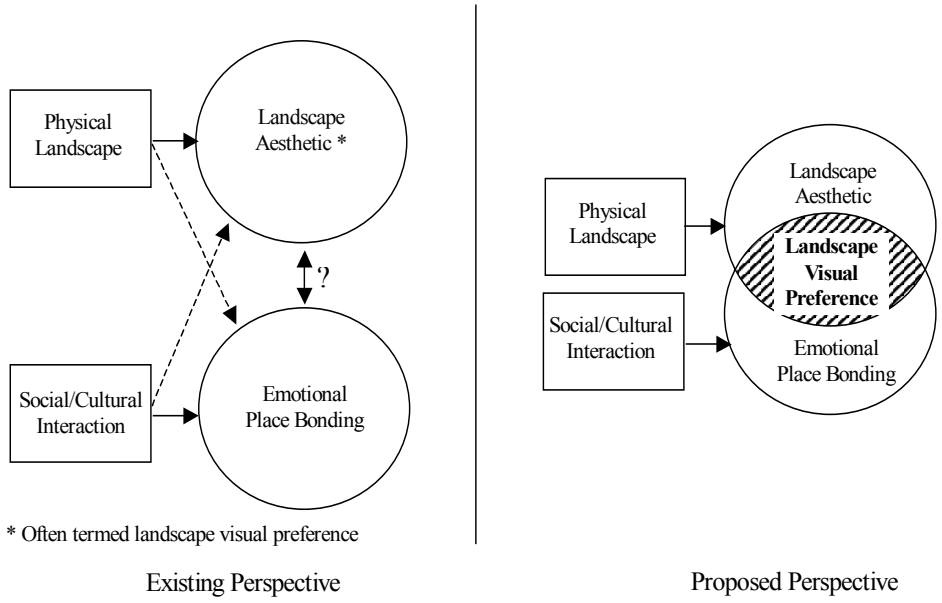

Figure 1.1 Proposed Model for Landscape Visual Preference

BACKGROUND

LANDSCAPE AESTHETICS

Visual preference research on landscapes has emphasized the physical aspects often overlooking the complete range of factors that may explain landscape visual preference. Although many researchers have used the term "landscape preference" (Abello & Bernaldez, 1986; Buhyoff, Wellman, Koch, Gauthier, & Hultman, 1983; Kaplan & Kaplan, 1989; Kaplan, Kaplan, & Brown, 1989; Kreimer, 1977; Purcell, Lamb, Peron, & Falchero, 1994; Tips & Savasdisara, 1986a), they have focused on the physical or what is often called the formal parts of a scene, i.e., landscape aesthetics. Landscape

aesthetics has long been an important component of environmental planning and management. Shafer and Mietz (1969) indicated that the physical aesthetic was the most important "wilderness-recreation value." Aesthetic factors are also believed to be of basic importance in the history of land protection (de Nogueira & Flores, 2004). Researchers have agreed that the tourism and recreation phenomenon is heavily dependent upon aesthetics as they relate to the experience of a landscape (Fairweather & Swaffield, 2002; MacKay & Fesenmair, 1997; Manning & Freimund, 2004; Meitner, 2004; Stewart & Floyd, 2004).

Landscape aesthetic research has focused on human responses to the physical landscape and has been based largely on biological or evolutionary explanations for why people prefer certain characteristics in a landscape scene, e.g., habitat theory (Appleton, 1996), information-processing theory (Kaplan & Kaplan, 1989), or psychological explanations, e.g., arousal theory (Wohlwill & Kohn, 1976), as well as the schema discrepancy model (Purcell, 1986). Habitat theory suggests that humans have inherent preferences for environments that offer good survival conditions like water and low, branching trees (Appleton, 1996). Many studies have supported this point of view, finding that elements such as trees and water are among the most preferred landscape features (Kaplan, 1984; Kaplan & Austin, 2003; Schroeder, 1991; Schroeder & Anderson, 1984). Arousal theory suggests that environments provide certain stimuli for humans, and that environments that provide an optimal level of complexity will be preferred (Wohlwill & Kohn, 1976). The schema discrepancy model suggests that landscape preference is the result of a matching process between the characteristics of information currently available, and a representation stored in memory related to

previous but similar experiences (Purcell, 1986). Empirical studies have supported this model and suggest that preference is influenced by the typicality of a landscape, in other words, the way a landscape compares to some stereotypical image that a person has for a type of place (Daniel, Wheeler, Boster, & Best, 1973; Hagerhall, 2001; Herzog & Stark, 2004).

Information-processing theory is one of the most significant and well-studied theories in landscape visual preference research (Bourassa, 1991; Stamps, 2004). The model suggests that preference for a scene is dependent upon two basic human responses to an environment: the need to understand and a desire to explore (Kaplan & Kaplan, 1989). Information can be derived immediately from an environment, or it can be inferred. These two dimensions (human needs and information availability) were used by Kaplan and Kaplan to compose a preference matrix which has four key information variables: complexity, coherence, mystery, and legibility. Kaplan and Kaplan (1989, p.53) defined complexity as "the number of different visual elements in a scene: how intricate the scene is; its richness." Coherence refers to order and organization, "the patterns of brightness, size, and texture" in the scene. Mystery relates to a scene's depth and the hidden qualities that may draw one closer in an effort to explore and gain more information. The scene "invites one to a distant, but new vantage point." Legibility helps people to understand an environment and "to comprehend and to function effectively" when the environment provides cues and landmarks that assist, for example, with way-finding. These four variables are sometimes called "information variables" and have been suggested as predictors of the landscape's aesthetic (Bell, 1999; Gifford, 2002; Kaplan, Kaplan, & Ryan, 1998; Stamps, 2004). They are believed to predict innate

landscape preference because they represent characteristics (information) in the environment that humans have been interpreting for millions of years in order to survive. This survival has been based on an ability to read the land in order to find food and water and to be safe from physical harm.

EMOTIONAL PLACE BONDING

Emotional place bonding is a complex phenomenon that emphasizes the affective and symbolic relationship between a person and their environment. Unlike the physical environment concepts of landscape aesthetics, emotional bonds emphasize direct human experience and an involvement with a place. This approach focuses on the concept of "places" which gain meaning for individuals, groups and communities through accumulated knowledge. For example, Mannell (1996) defined the deep meaning in natural settings as the "emotional and symbolic ties nature and wilderness users have to outdoor recreation settings" (p. 413). The emotional and symbolic ties are not limited to a wild and natural environment. People may have an affective bond to any place depending on their current or past experience, or even to the future (some place they dream of) (Giuliani, 2003). The emotional bond to a place also goes beyond the simple security and comfort of a place like home (Hammitt, Backlund, & Bixler, 2006). Researchers have extended the concept of emotional bonding to recreational areas (e.g. Kyle, Graefe, & Manning, 2005; Williams, Patterson, Roggenbuck, & Watson, 1992; Williams & Vaske, 2003) or tourism destinations (e.g. George & George, 2004; Hwang, Lee, & Chen, 2005; Lee, 2001).

Riley (1992) proposed that three processes are involved in developing a relationship with a place. First, there is a biological process similar to the information-processing theory of Kaplan and Kaplan (1989). Human beings develop a certain response to place-specific demands leading to their affective feelings toward a place. Second, emotional bonds would be formed through the long-term interaction of human societies with places over time. The emotional bond is influenced by geography and human culture, both of which transform the experience of a space into a culturally meaningful and shared symbol (Low, 1992). The third process is the influence of personal experience. An individual's own life and experiences, such as childhood experiences, play a major role in the development of emotional bonds. Literature often emphasizes the role of social/cultural relationships to create an emotional bonding with places (Giuliani, 2003; Stedman, 2003b).

The emotional bonding and place attachment literature holds that the memories and meanings of place are within people rather than embedded in the landscape. Relph (1976) stated that "a place is essentially its people, and appearance or landscapes are little more than a backdrop of relatively trivial importance" (p. 33). Greider and Garkovich (1994) suggested that landscapes are symbolic environments with which people associate meaning, values and beliefs. Because of the different associated meanings, a worthless environment to one social group might be a sacred place for another group.

Interaction with other people is suggested as one of the important factors for creating emotional connections with a place. Mesch and Manor (1998) observed that attachment to a place is positively related to the number of close friends and neighbors

in that area. Eisenhauer et al. (2000) found in their study that interaction with family and friends is the most important reason for a place to become special. Kyle et al. (2005) have suggested that "social bonding" might be a dimension of place attachment, in addition to place identity and place dependence. Low and Altman (1992) indicated that "places are repositories and contexts within which interpersonal, community and cultural relationships occur, and it is to those social relationships, not just to place, to which people are attached" (p. 7). It may be the people or relationships that develop in a place to which people actually bond. How these feelings for places relate to preferences for certain types of landscapes is not well understood.

THE RELATIONSHIP BETWEEN LANDSCAPE AESTHETICS AND EMOTIONAL BONDING

Research on both landscape aesthetics and emotional bonds has sought to understand people's feelings about a place or places. A few people have questioned the separateness of these two constructs. For example, Kaltenborn and Bjerke (2002) argued that research into landscape aesthetics should better incorporate human involvement, and emotional bonding research should incorporate reactions to the physical environment. Kaltenborn and Bjerke found a positive relationship between a landscape's attractiveness and a person's level of attachment to it. Jones et al. (2000) found that photo-based visual preferences and the feeling of belonging to a place are highly related. Kyle, Mowen and Tarrant (2004) also suggest that the preference to a place may be an antecedent for the place bonding.

Farnum, Hall and Kruger (2005) mentioned that "sense of place studies may want to differentiate themselves from studies of landscape preference (landscape aesthetics), and therefore do not focus on generic environmental features" (p. 47). They also suggested "some middle ground would be helpful," and that linking emotional place bonding to physical landscape elements may be the first step toward achieving that middle ground.

Some who have examined the ways we think about places have suggested that there are attachment-like emotional components that influence our visual preferences for physical landscapes, and therefore the two approaches to understanding (emotional bonding and innate aesthetic character) should be considered together (Farnum et al., 2005). For example, Costonis' (1982) cultural stability-identity theory argued that aesthetic value of a landscape is a reflection of a group's desire to protect its unique identity. According to the theory, a disliked landscape will become acceptable or even preferred when people gradually begin to identify with it. A similar point was made even earlier by Lowenthal (1978) when he indicated that attachments to a landscape might transcend scenic value alone. In a study of the restorative effect of favorite places, Korpela and Hartig (1996) reported the feeling of belonging to a place is an important factor in preference. Daniel (2001b) indicated that research into landscape meaning and a sense of place are extended from the research of interactive landscape quality. Therefore, it seems reasonable to work harder to combine the concepts of landscape aesthetics and emotional bonding in an effort to better understand why people have certain visual-preferences for landscapes.

STATEMENT OF PROBLEM

This research will examine the relationship between landscape aesthetics based largely on biological or innate preference and emotional place-bonding which is based on learned meaning that influences preferences in a specific type of recreation and tourism setting. Two basic objectives will guide this study: 1) to understand the relationship between the physical character of landscapes and the emotional bonds people form with landscapes, and 2) to understand if and how the relationships between formal landscape aesthetics (innate preference) and emotional bonding (learned preference) predict visual preference for a landscape.

DEFINITION OF TERMS

Several terms are used throughout this study, which should be clarified: (1) "Landscape visual preference" refers to a person's degree of like or dislike for the visual appearance of a place. It is the comprehensive response to a place that is induced by visual representations. (2) "Emotional place bonding" refers to the symbolic relationship formed by people who give culturally shared emotional/affective meanings to a particular space or piece of land that provides the basis for the individual (Low, 1992). (3)"Landscape Aesthetics" is the synonym of Nasar's (1989) "formal aesthetic," which refers to physical landscape elements like trees, water, mountains or sky, or the attributes of physical landscape like form, line, color, and texture. The concept of landscape aesthetics was operationalized using Kaplan and Kaplan's (1989) information variables, i.e. complexity, mystery, coherence, and legibility.

SIGNIFICANCE OF THE STUDY

This study will integrate two major perspectives of the human-environment relationship, a landscape aesthetic framework and the process of forming emotional bonds, and propose a model of landscape visual preference. This study will also further our understanding of the true value of an environment by considering both physical and emotional responses of people to a given place. The model should improve current resource planning and management by identifying important landscape characteristics that are essential for place meaning and attachment; it should also help to reduce the conflict between development and conservation. By understanding the relationship between physical landscape and emotional bonding, the results could aid in the development of planning guidelines that strengthen a sense of place or help preserve the authenticity of parks, other public lands and tourism destinations.

CHAPTER II
THEORETICAL AND CONCEPTUAL FOUNDATION

A review of the concepts that underpin this study will help clarify and justify the major elements of investigation related to this research. This chapter will be divided into four parts. The theoretical basis for this study centers on the concept of landscape perception. The first part will review landscape perception using research in environmental psychology and landscape research as its theoretical foundations. This review will present the development of the concept of landscape visual preference, and also consider insufficiencies in this human-interaction perspective. The second part will review the notion of emotional bonds related to place as developed in human geography, parks, and recreation research. The relationship and similarity between the concepts of landscape visual preference and emotional place bonding will be reviewed in the third part. Finally, the chapter will close with a proposed research framework and a list of the main research hypotheses.

LANDSCAPE VISUAL PREFERENCE

Landscape visual preference has received attention for at least the last half century. Researchers who have tackled this topic have come from different disciplines, e.g., landscape architecture, geography, forestry, outdoor recreation, and psychology (Zube, Sell, & Taylor, 1982). There are many studies on landscape visual preference, and many closely related or even redundant terms have been used to describe the concept, such as ”scenic quality” (Brunson & Shelby, 1992; Craik, 1983; Daniel et al.,

1973; Zube, 1974), “aesthetic quality” (Cook, 1972; Pepper, 1970), “aesthetic preference” (Daniel, 2001a), “aesthetic perception” (Ribe, 2005), “visual attractiveness” (Pitt, 1989), “visual quality” (Eben Saleh, 2001; Hull & McCarthy, 1988; Lien & Buhyoff, 1986; Manning, Lime, Freimund, & Pitt, 1996; Sheppard & Picard, 2006; Sullivan & Lovell, 2006), scenic perception (Oku & Fukamachi, 2006), and “landscape visual preference” (Abello & Bernaldez, 1986; Buhyoff et al., 1983; Kreimer, 1977; Purcell et al., 1994; Tips & Savasdisara, 1986b), “visual preference” (Im, 1984; Nasar & Hong, 1999), and “scenic beauty” (Daniel & Boster, 1976; Daniel, Brown, King, Richards, & Stewart, 1989; Li, Rudis, & Herrick, 2004; Ribe, 2002). This study uses the term “landscape visual preference” and defines it as an individual’s degree of like or dislike for the visual appearance of a place as compared to another (Daniel, 2001b; Im, 1984; Lothian, 1999; Schroeder, 1991). The term “landscape” is used to indicate the “perceived environment” rather than a specific physical space (Bourassa, 1988). Since the study focuses only on landscapes that are visually perceived, the term “landscape visual preference” was used in this study to differentiate the preferences derived from other senses (e.g., sound, smell, touch).

Landscape perception is considered to be a function of the interaction between people and the environment. Zube et al. (1982) proposed three components for landscape perception: human, landscape, and interaction (see Figure 2.1). The human component includes past experience, knowledge, expectations and the socio-cultural context of individuals and groups. The landscape component includes both individual elements and landscape as a separate entity. The interaction results in outcomes that in turn affect both the human and the landscape components. Leopold (1969) suggested that the major

factors for landscape visual preference are 1) physical features – the presence of features like mountains or valleys and their height and width; 2) the region's biology — the vegetation and other biological components of the environment; and 3) the human interest factor — how the landscape impresses people. In other words, this would mean the human interests associated with the environment where certain phenomena exist or where unusual events have occurred. Therefore, landscape visual preference is the joint effect of specific features of the landscape interacting with relevant psychological (perceptual, cognitive and emotional) processes in the human observer (Brown & Daniel, 1987; Daniel, 1990, 2001b; Daniel & Boster, 1976; Zube, 1974). Landscape visual preference is a dynamic process in which the human-landscape interaction feeds back to both the humans and the landscape.

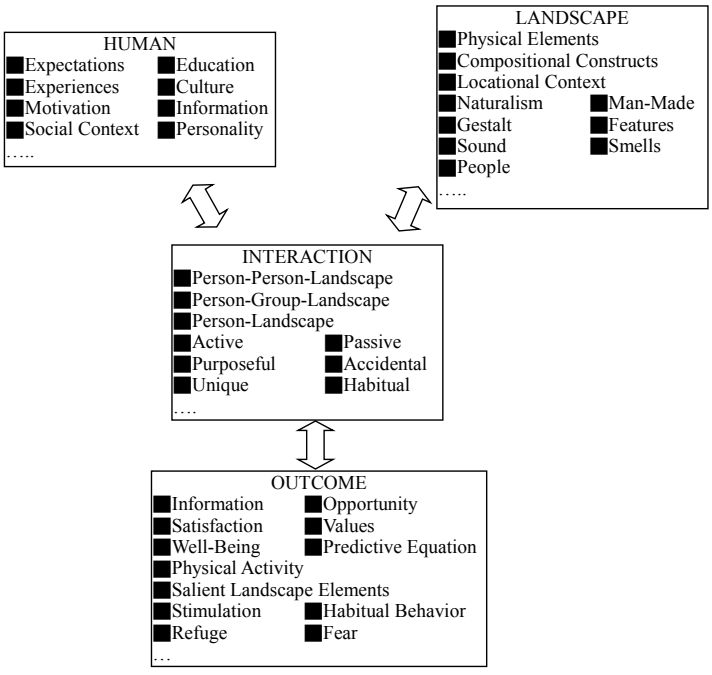

Figure 2.1 Landscape Perception Process (after Zube et al., 1982)

An individual's response to his/her environment consists of three components: the physiological response, an affective appraisal/emotional reaction, and a behavior change (Figure 2.2), and the aesthetic response occurs at the intersection of the three (Nasar, 1997). Landscape perception studies have focused largely on the affective appraisal/emotional reaction part. The affective appraisal refers to the individual's judgments of like or dislike of a certain environment (Nasar, 1997), while the emotional reaction refers to the internal state (such as pleasure or arousal) that relates to the environment (Russell & Snodgrass, 1987). The related theory will be provided in the following section.

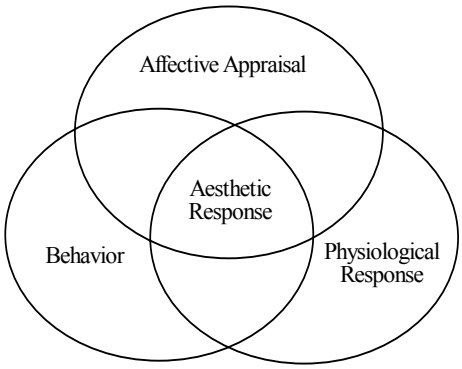

Figure 2.2 Components of an Aesthetic Response (after Nasar, 1997)

The basic assumptions made in landscape visual preference research are the contrasting paradigms of objectivism and subjectivism. Lothian (1999) tracked the philosophy and history of these two paradigms. The objective perspective recounts that the aesthetic quality of a thing is to be found in the properties of that thing. Aesthetics is

viewed as some combination of physical attributes that appeals to an innate sense of good or bad. In other words, there are some characteristics in landscapes that will be generally preferred, or not, by everyone. On the other hand, a subjective account of aesthetics depends on the individual observer. The aesthetic value is not dependent on an innate quality of objects, but on an interpretation made by individuals with variable amounts of learned information and past history in a place. It seems that the subjective paradigm has largely won out after several centuries of debate (Daniel, 2001b). Lothian (1999) also proposed that only the subjectivist model should be used in landscape visual preference research.

THEORETICAL FRAMEWORKS THAT EXPLAIN LANDSCAPE VISUAL PREFERENCE

One of the main purposes of LVP research is to understand elements that account for the preference for a landscape. There are many studies that have identified different factors that influence landscape preference. Unlike traditional disciplines where theories are formed first and then followed with tests, many studies have mainly focused on understanding the correlation between landscape preference and different factors, and not on the underpinning theories. Many researchers have argued that the basic theory of landscape preference has been neglected (e.g. Appleton, 1975; Bourassa, 1990; Carter, 1976; Penning-Rowsell, 1981; Porteous, 1982; Priestley, 1983; Punter, 1982; Sancar, 1985; Wohlwill, 1976; Zube et al., 1982). For this reason, although research on landscape visual preference has been going on for half a century, there are only a

handful of theories that have been used to explain people's preferences for a particular landscape.

Recent efforts have attempted to formulate theories (e.g. Bourassa, 1991; Daniel, 2001b; Porteous, 1996). For example, Bourassa (1990) concluded that there were three hierarchical components that accounted for visual preferences for landscapes (see Figure 2.3): phylogenesis (biological evolution), sociogenesis (cultural history), and ontogenesis (individual development). Phylogenetic preference is based on the primitive relationship between an organism and its environment. This component of preference comes from an inherent biological instinct meaning that this part of preference should lead to some shared cross-cultural responses to landscapes. Sociogenesis refers to a nurtured appreciation of a landscape where visual preferences are influenced by individuals' cultural backgrounds. Ontogenesis is personal development, which is influenced by both biological laws and cultural rules. There are relatively fewer studies that have focused on ontogenesis. Most traditional research has been based on the biological and cultural perspectives (Bourassa, 1988).

Landscape Aesthetic: the Biological/ Physical Aspect of Landscape Visual Preference Theories

The biological theories assume that people have a consistent preference for certain kinds of landscapes or landscape elements because of biological reasons, e.g., the need for survival, the need for stimulus. These theories focus on the physical elements of landscape (e.g., trees, water, sky) or attributes of physical elements (form, line, color, texture, or spaciousness), and probe the relationship between physical landscape elements/attributes and landscape preference.

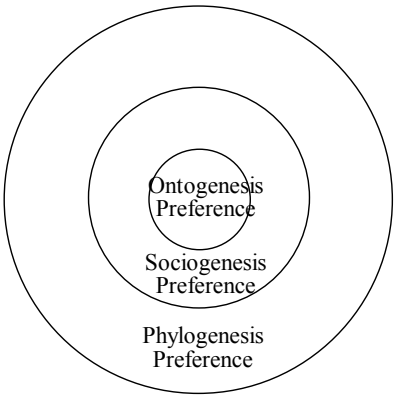

Figure 2.3 Three Levels of Preference for Landscape (after Bourassa, 1990)

The focus on physical landscape facilitates practitioners to adopt these theories for recreation planning and design. Therefore, biological/physical explanations have provided the main stream of landscape visual preference research (Newell, 1997). The portion of landscape preference that is explained by physical/biological theories is termed "landscape aesthetic" in this study, in order to separate it from the more comprehensive "landscape preference." Landscape aesthetic theories include habitat theory, prospect-refuge theory, information-processing theory, arousal theory, and a neuropsychological perspective.

Habitat Theory

Appleton (1996) argues that people can obtain aesthetic pleasure from the satisfaction of basic motives. Therefore, an environment that appears to offer the satisfaction of biological needs will elicit a positive response from a human being. Appleton proposed "that aesthetic satisfaction, experienced in the contemplation of landscape, stems from the spontaneous perception of landscape features which, in their

shapes, colours, spatial arrangements and other visible attributes, act as sign-stimuli indicative of environmental conditions favourable to survival, whether they really are favourable or not. This proposition we can call habitat theory" (Appleton, 1996, p. 62).

Prospect-Refuge Theory

Based on his habitat theory, Appleton (1988; 1996) further argued the importance of the ability "to see without being seen." He identified two components of landscape aesthetic preference: the possibility of accessing the information within the landscape through visual access, termed "prospect;" and safety through the possibility of being out of sight in a place of "refuge." The opportunity to see (prospect) without being seen (refuge) supposedly satisfies a biological need, and therefore provides a sense of pleasure. He argued that humans acquire and store information from the environment in such a way that it can be efficiently and quickly retrieved when needed to ensure survival.

Ecological Perspective

The ecological perspective is that the natural, unmodified ecosystem carries the greatest aesthetic value of all (Sell, Taylor, & Zube, 1984). This perspective is based on Aldo Leopold's conservation ideas (Parsons, 1995). The ecological perspective takes the biological principles of ecosystem management (biodiversity, sustainability, etc.) as givens, and then asserts that human environmental aesthetic preferences should be consistent with those principles. Therefore, there are some "objective" or intrinsic aesthetic qualities in the environment (Uzzell, 1991). Many researchers adopted this perspective (e.g. Callicott, 1992; Gobster, 1999; Saarinen, Seamon, & Sell, 1984). For

example, Callicot (1992) follows the concept of Leopold's Land Aesthetic, and argues that ecological knowledge is also an important aesthetic value.

The ecological perspective contrasts with the traditional "scenic aesthetic" (Parsons, 1995), since it regards the scenic aesthetic preferences to be superficial constructs from 17th century landscape aesthetic theories conveyed in paintings of groomed landscapes (Gobster, 1999). Besides, the perspective emphasizes that a piece of land's aesthetic is intertwined with that land's ethic (Saarinen et al., 1984). Therefore, the goal of the ecological aesthetician is not to investigate the pleasurable human-environment relationship, but rather to identify the proper environmental aesthetics (Parsons & Daniel, 2002).

The biocentric ecological perspective is very different from the traditional anthropocentric landscape visual preference. Parsons and Daniel (2002) have provided a comprehensive discussion about the arguments raised. Daniel (Daniel, 2001b, p. 278) argues that the biophysical processes are accepted as appropriate instruments for changing landscape features, but human perceptual judgments are the most important indicators of visual aesthetic quality. However, the different perspective still provides an opportunity for new thinking on landscape visual preference research.

Arousal Theory

Arousal theory suggests that aesthetic preference corresponds to stimuli from the environment. Berlyne (1960) presumed that individuals will engage in a voluntary, active exploration of a stimulus, and that the stimulus is proportional to the amount of uncertainty and conflict felt by the individual (c.f Wohlwill & Kohn, 1976). Two types of explorations were proposed (Wohlwill, 1976). "Specific exploration" occurs when an

individual is confronted with a high arousal level and seeks to lower the level through exploration. Conversely, "diversive exploration" occurs when an individual with a low arousal level seeks some stimulus. Therefore, the relationship between preference and degree of arousal has an inverted "U" shape. Individuals tend to prefer environments that elicit some intermediated level of arousal.

Neuropsychological Perspective

Smith (1977) explained visual preference from the neuropsychological perspective (c.f Porteous, 1982), in which people seek physical rewards from the different types of visual elements available to them. Smith indicated that the limbic system of the human brain is the center of all emotions. The limbic system consists of the brain's left and right hemisphere. The left hemisphere is for rational, verbal, mathematical, logical, analytical, and deductive thought, and the right hemisphere is for thoughts that are holistic, intuitive, or spatial, and for pattern-recognition. Different types of visual elements would reward certain parts of the limbic system. Smith proposed that the preferred environment should provide balanced stimuli for the limbic system without emphasizing a specific hemisphere. Therefore, the preferred environment should be complex, colorful, and also mysterious.

Information-processing Theory

Information-processing theory is the most significant biologically-based theory in landscape visual preference research (Bourassa, 1991; Stamps, 2004). The information model (Kaplan & Kaplan, 1989) is again based on evolutional theory as put forth by Appleton (1996). The theory also combines perspectives related to the psychological need for stimulus (e.g. arousal theory) and therefore provides a more

comprehensive explanation for landscape visual preference. Kaplan and Kaplan suggest that there are two basic human responses to the environment, to explore and to understand, and two levels of information, immediate and inferred, have much to do with how people see and react to landscapes. These two dimensions were used to compose their preference matrix with four key cognitive variables (see Table 2.1): complexity, coherence, mystery, and legibility. Kaplan and Kaplan (1989, p. 53). Complexity is "the number of different visual elements in a scene: how intricate the scene is; its richness" and is seen as creating interest and thus a desire to examine it more closely. Coherence means to order and organize "the patterns of brightness, size, and texture" in the scene. Mystery represents the need to explore a scene and its depth, in order to gain more information or to "learn more." The scene "invites one to a distant, but new vantage point." The legibility of a landscape relates to understanding the environment based on elements like landmarks that allow people "to comprehend and to function effectively."

Table 2.1
Kaplan and Kaplan's Information-Processing Framework

Availability of	*Needs*	
Information	Understand	Explore
Immediate	Coherence	Complexity
Inferred	Legibility	Mystery

Summary

These theories of landscape aesthetics can be condensed into two groups, those comprised of ecological explanations and those of psychological explanations. The ecological explanations include habitat theory, prospect-refuge theory, and the ecological perspective. These theories are all based on habitat theory and postulate that landscape preference is based on the environment that best supports life. The psychological explanations focus on the mechanism of landscape preference within individuals. The psychological explanations include arousal theory and the neuropsychological perspective. Among these theories for landscape aesthetics, Kaplan and Kaplan's (1989) information-processing theory represents an approach that includes both the ecological and psychological explanations. The exploration dimension is similar to Appleton's prospect-refuge theory, and the understanding dimension is related to the arousal theory. The theory thus provides a more complete explanation of the landscape aesthetic, and is often recognized as the most significant theory in landscape visual preference research (Bourassa, 1991; Stamps, 2004).

Although the information-processing theory has been used in numerous studies (see Stamps, 2004), it still does not provide a comprehensive explanation for landscape visual preference. Kaplan and Kaplan (1989) have indicated that the information-processing model is incomplete, and have recognized the importance of familiarity and group differences to the preference of a landscape. These factors are not directly related to landscape aesthetic (physical landscape), and need to be explained from the cultural/symbolic perspective.

Cultural/Symbolic Landscape Visual Preference Theories

Different from the landscape aesthetic theories that focus on people's inherited or innate preferences for certain physical landscapes, the cultural/symbolic explanations emphasize that the preferences for certain landscape are developed through interactions with different landscapes over a long period of time. That is, people develop unique tastes for landscapes within a certain culture or lifestyle, except for those that stem from innate common preferences.

Individual Differences

Research has shown that preferences for landscapes are different in different groups of people, because people have set up different criteria for landscapes stemming from their various experiences. For example, Lyons (1983) indicates that landscape preferences will be influenced by gender, age, and residence. Other studies have found that demographic measures are predictors for landscape preference (Regan & Horn, 2005; Stamps, 1999; Strumse, 1996), although Stamps (1999) also found that landscape preference has a very high degree of consistency across many demographic characteristics.

The cultural differences in landscape preference were considered to be an importance factor influencing landscape visual preference (Ribe, 1994; Zube, 1974) Commer & Summit, 1996). For example, Zube and Pitt (1981) found cultural differences affect the influence of man-made structures on environmental preference. They suggest that there is "reason to believe that different value systems may prevail across culture." Yang and Brown (1992) also found both similarities and differences in the responses between western and non-western groups. They concluded that landscape

styles, as well as other elements, were the influencing factors on landscape preference. Many studies have also pointed out that the preference for certain landscapes are different between different cultures, like American tourists and Jamaicans (Zube & Pitt, 1981), Eskimo (Innuit) and non-Eskimo (Sonnenfeld, 1967), American Caucasians and African Americans (Flaschbart & Peterson, 1973), and residents and visitors (Orland, 1988).

On the other hand, similarities are also found between different culture groups. For example, Hull and Revell (1989) found that differences in landscape preferences between Bali natives and Balinese tourists were negligible. Newell (1997) investigated the favorite places of students from three different countries and concluded that it was "easier to find similarities in place preferences than to find differences." The respondents overwhelmingly expressed the importance of their own place, home, and belongings. Other researchers also found similarities between the patterns of preference to landscape of Americans and Australians (Kaplan & Herbert, 1988), Swedes (Ulrich, 1977), and Japanese (Nasar, 1988).

Familiarity

A factor that is related to cultural background is familiarity. Familiarity is seen as the most important influence on visual preference (Kaplan & Kaplan, 1989). Kennedy and Zube (1991) found that the degree of preference for native species was related to their length of residence in Tucson. Rowntree (1981) suggested that "visual neighborhood biases" in landscape are what cause people to preserve familiar landscapes. Buhyoff et al. (1983) examined the landscape visual preference of people from different countries and suggested that landscape visual preference might be influenced by

familiarity with the features of their own environment. Orland (1988) found that rural residents evaluated the scenes that were similar to where they lived more favorably than those of urban residents. Similar effects of familiarity were found in the study of Kaplan and Herbert (1987) and Herzog et al. (2000); they all found higher preference ratings for Australian scenes among Australian test subjects. Gan and Miller (2001) also found that respondents who lived far away from the study site had a lower aesthetic rating than nearer groups.

Typicality

A familiar environment usually means it is similar to some place in our memory, so typicality is discussed with familiarity in some studies (e.g. Nasar, 1994; Purcell, 1992). Typicality is defined as the extent a member of a group has in common with other members of that group and to what extent they are dissimilar to members of other groups (Rosch & Mervis, 1975). Typicality has also been shown to be influential in landscape visual preference (Peron, Purcell, Staats, Falchero, & Lamb, 1998; Purcell, 1992). Many researchers have suggested that people would prefer landscapes that are more consistent with their mental images (Nasar, 1994; Purcell & Nasar, 1992). The effects of typicality can be explained by both adaptation level theory and schema discrepancy theory.

Helsons (1964) proposed the theory of adaptation levels and suggested that people evaluate their environments (focal stimuli) by adapting to contextual and residual stimuli (c.f. Kim & Crompton, 2001). Based on this theory, Wohlwill and Kohn (1976) proposed that evaluation of an environment is based on prior experience in an environment. In Wohlwill and Kohn's study, they compared the environment ratings of newcomers from large metropolitan areas and those from small towns. The results

supported adaptation level theory. The environment was rated as noisier, more crowded, and more polluted by migrants from small towns than those from metropolitan areas. Similarly, Flaschbart and Peterson (1973) suggest that individuals' preferences to housing environment are influenced by their sensitivity to what they are deprived of, and they tend to inflate the value of that which they have been deprived.

Purcell (Purcell, 1986) proposed the schema discrepancy model, which argued that ongoing experiences are the result of a matching process between the characteristics of currently available specific instances and a representation stored in memory of the characteristics of previous similar experiences. The stored representation is called a schema, an idea which was developed in cognitive psychology and is defined as any cognitive structure that specifies the general properties of a category of objects or event and leaves out any specification of details that are irrelevant to that category. Affective response occurs when there is a mismatch or discrepancy between the attributes of the current instance and the attributes of the prototype. Whitfield (1983) pointed out that the more an object matches the schema, the more people prefer it.

Daniel et al. (1973) indicated that a preferred scene might suddenly be considered aesthetically inadequate if the observer were told that it represented an area in a National Park. These researchers suggested that the observers' judgment criteria might be based on their concept of what the environment ought to look like. In such cases, people are comparing the actual environment with a prototype schema that they carry around in their heads

Place Label

The label or name of a place is the most straightforward meaning of that place. The name of a place was believed to suggest the special definition of the landscape (Sousa & Garcia-Murillo, 2001). The labels placed on pictures are believed to influence an observer's evaluation standards (Daniel et al., 1973), and have been considered to be a potentially contaminating factor for visual preference study (Peron et al., 1998, p. 292). For example, Anderson (1981) found that terms like "wilderness area" and "national park" would elevate the perceived scenic quality of forests, while "commercial timber stand" and "leased grazing range" would reduce it. They concluded that the labels changed the expectation, or inserted different landscape meanings for the landscapes perceived. In a similar study, Hodgson and Thayer (1980) argue that preference is related to perceived meaning. They showed that photographs of landscapes were consistently ranked lower when labeled with terms implying human influences. Pictures were ranked higher when labeled "lake," "pond," "stream bank," and "forest growth," while the same pictures labeled "reservoir," irrigation," "road cut," and "tree farm" showed significantly lower levels of preference.

Researchers also found that providing information about an environment's setting would influence the visual preference. Buhyoff et al. (1978) found that knowledge of the presence of damage by southern pine beetles had a significant negative impact on preferences for forest scenes. Keamey (2001) found that providing information about forest management practices and scenes of the forest that might be the result of the proposed management would increase the preference for the scenes that were initially less preferred. Callicot (1992) argued that with ecological knowledge,

people could "appreciate and relish certain environmental experiences that are not literally pleasurable or sensuously delightful" (p.16). In other words, people may associate certain meanings (such as the environment for survival) to certain kinds of environments, and the meaning may overcome the principles of landscape aesthetics for the purposes of landscape preference.

Cultural Stability-Identity Theory

The cultural stability-identity theory (Costonis, 1982) focuses on a more abstract factor that influences individuals' preferences for landscapes: the stability of identity. Costonis (1989) has suggested that aesthetic values are reflections of a group's desire to protect their identities. That is, people will be more likely to prefer places associated with their identities. Costonis views that aesthetic response is comprised of reactions to symbolic, non-sensory aspects of the environment, as well as to the environment's sensory attributes, but he believes that the symbolic aspects of the landscape are more important than any canons of visual beauty.

In other words, landscapes can serve as symbols of different cultural groups. Symbolic features include: "the meanings ascribed to it by virtue of our individual histories…and our experiences as members of political, economic, religious, and other societal groups" (Costonis, 1989, p. 399). The importance of the symbolism of landscape is demonstrated by the fact that even the labels can have significant impacts on preferences (Bourassa, 1991). The numerous cross-cultural comparisons of landscape visual preferences also suggest that there are certain variations between the different cultures. Bourassa (1990) indicated the "professional status" (level of expertise in planning and design) and "existential status" (degree of insideness or outsideness with

respect to the group being planned for) are both important perspectives for the cultural paradigm.

Symbolic Aesthetic Framework

Stokols and Shumaker (1981) indicated that a complicated environment is a composite of material and symbolic features. The symbolic features are gradually acquired through an interaction with group activities and experiences over time (Stokols, 1990). Carlson (1977) indicated that an environmental aesthetic is a function of various non-formal qualities, in addition to the formal qualities of a landscape. Both the individual's construction and the more broad objective attributes of an environment contribute to its visual quality.

Some researchers have suggested a symbolic model (Chon, 2004) which focuses on formal and symbolic aspects of landscape visual preference (Lang, 1987; Nasar & Jones, 1997; Porteous, 1996; Rapoport, 1977). Rapoport (1977) roughly classifies the range of environmental attributes in the literature into two groups, perceptual and associational, later labeled by Lang (1987) as formal aesthetic and symbolic aesthetic. The formal (perceptual) attributes relate to the physical properties and relationships, such as shape, proportion, rhythm, scale, degree, complexity, color, illumination, shadowing, mystery, novelty, etc. The symbolic (associational) attributes reflect an appreciation of the meanings or values of the environment; they are the mediating variables of human environmental experience (Nasar, 1997). The symbolic attributes are acquired from interaction with the immediate environment or from past experience in a similar place. Examples of symbolic attributes are naturalness (the degree of human influence, or presence of natural elements) or style (a system of forms) (Nasar, 1994).

Greenbie (1982) indicated that much aesthetic significance, especially of little-visited landscapes such as those in the wilderness, is symbolic. Since there is only a few people who have ever experience an actual wilderness, Greenbie suggests that it is the idea of nature that attracts people rather than the environment itself. Greenbie also believes that "symbolism is the most important aesthetic aspect of any landscape" (p. 5)

Nasar (1989) further differentiated the symbolic aesthetic into denotative and connotative meanings. Denotative meanings refer to the judgments of what an environment is, such as a church, a theme park, or a national park. Connotative meanings reflect the inference of the evaluative and affective quality of an environment (see Figure 2.4). For example, although modern and Tudor style buildings may have similar types, sizes and costs, and may also share similar denotative meanings (such as that of a single family home), the connotative meanings that people associate with these different styles may be different, e.g., their quality, value, and even the characteristics of the respective owners (Nasar, 1997).

Huang (1998), after reviewing recent literature, indicated that most of the environmental attributes that have been measured were formal. Some researchers believe that symbolic aesthetics have too often been ignored, except in studies of art history (Carlson, 1977; Lang, 1988; Porteous, 1996). Bourassa (1991) has criticized the current landscape visual preference prediction methods as depending too heavily on formal qualities. Bourassa has argued that formal aspects alone do not constitute an adequate analysis of visual quality. Beyond formal qualities, individuals appreciate qualities of austerity such as those in a desert landscape or the ominous look of the sky before a storm. These qualities are examples of the symbolic element, or "style" (Nasar, 1997)

and "taste" (Lowenthal, 1978; Lowenthal & Prince, 1965). They are the values and emotions people attach to certain types of environments through long-term interaction with a specific place or similar types of environments.

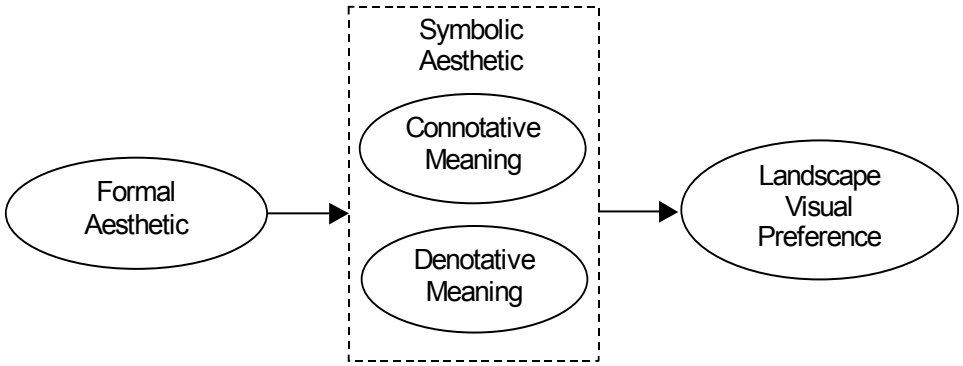

Figure 2.4 Symbolic Framework (after Nasar, 1997)

METHODS USED IN LANDSCAPE VISUAL PREFERENCE RESEARCH

There are numerous methods that have been used to measure landscape visual preference. Researchers have proposed several approaches to methodology for use in landscape visual research (Daniel & Vining, 1983; Uzzell, 1991; Zube et al., 1982).

Expert Approach

Daniel and Vining (1983) termed the expert approach the "formal" and "ecological" paradigm, and Uzzell (1991) called it the "ecological" and "formal aesthetic" approach. The expert paradigm assumes that trained professionals can analyze landscapes and translate landscape elements into a descriptive assessment of visual

preference. Therefore, landscapes are evaluated by trained experts, according to the qualities of the landscape.

Although the researchers using this paradigm recognized that the evaluation of landscape visual preference should reflect the standards of the people who are using the environment, they believe that experts are more sensitive and capable of evaluating different types of landscapes. It is their belief that "the standards of the experts of today are more likely to be realistic than the unexpressed opinion of the majority who often do not even see the elements that contribute to a well formed landscape" (Wright, 1974, p. 312). Carlson (1977) believes that public preferences are heavily influenced by environmental critics or experts who have the ability to appreciate the intangible aesthetic value of the environment.

The expert approach is heavily based on the fine-art aesthetic and ecological perspective. It is also a relatively objective perspective, because the approach is based on the professional inspection of relevant features in the landscape, while considering the condition of the viewer (number, position, etc.). However, the expert approach does not consider the experience of the general public, and has been largely replaced by perception-based methods (Jacques, 1980; Uzzell, 1991).

The Psychophysical Paradigm

The psychophysical paradigm holds that the landscape is a source of stimuli that elicits a human aesthetic response. The theoretical basis for the paradigm is the stimulus-response assumption in psychology (Sell et al., 1984) in which the landscape is outside of the individual and is perceived without cognitive processing. The main concern of the paradigm is to identify important landscape elements for practical use. An example is

the study by Shafer et al. (1969) that used linear regression to examine the relationship between landscape composition and the visual preference for landscape. They suggested that areas and perimeters of landscape components (e.g., sky, water, and vegetation) in a scene would influence landscape preference. The seminal work of Daniel and Boster (1976) also tests the effect of different physical landscape components (e.g., amount of downed wood, average tree diameter, tree density, stumps, or crown-cover canopy) on landscape visual preference.

Although the paradigm is useful for identifying important landscape elements for planning and management, it has been criticized as lacking a theoretical conception of how humans perceive and interact with the landscape (Sutton, 1997, p.13). Lowenthal (1978) also noted that there is no proven basis for separating the visual quality into separated parts of landscape features.

The Psychological Paradigm

The psychological paradigm, also termed the cognitive paradigm (Daniel & Vining, 1983), assumes that landscape quality is constructed in the human mind from visual information gathering. Preference is not derived form the environment directly, but rather from its interpretation. The approach is more subjective and emphasizes the cognitive and affective reactions elicited by landscapes. Most of the aforementioned biological theories were applied within this approach, since they all depend to some extent on cognition and interpretation.

The Experiential Paradigm

The experiential paradigm focuses on the experience or phenomenon of human-environment interaction. It relies on art history and literature as theoretical antecedents (Sell et al., 1984), and places the greatest emphasis on individual subjective feelings, interpretations and expectations. The experiential research assumes that aesthetic quality comes from landscapes but also from the meaning that people attach to them. The preference to landscape is related to the context of a particular situation, and from other emotional experiences.

Due to the complex nature of the paradigm, the research methods primarily involve phenomenological explorations and a literature review (Sell et al., 1984). It is also termed the "phenomenological model" (Daniel & Vining, 1983; Uzzell, 1991). The focuses of this research are on sense of place (Tuan, 1977), historical and cultural expressions (Lowenthal & Prince, 1965), and on visual landscape degradation (Jackson, 1970).

The approach is sensitive, but makes it difficult to compare results from different settings. Daniel and Vinning (1983) did not consider the phenomenological method as a method of landscape assessment. However, they still indicated that experiential research might provide a more valid assessment of landscape experience than other models because of its greater attention to human-oriented concerns and less attention on details of the landscape.

These approaches all have different applications. Zube et al. (1982) compared the characteristics of the four paradigms (see Table 2.2). Sell et al. (1984) indicated that the expert and psychophysical approaches have practical applications for research. They are searching for answers that can be directly used by designers or resource managers. On the other hand, the psychological and experiential approaches examine the meaning of landscape perception. Therefore, the latter two approaches are more likely to contribute to theory building.

The roles of humans are believed to differ across paradigms, from passive observer in the expert paradigm to active participant in the experiential paradigm (Sell et al., 1984). The role of landscape is also from the dimension of the expert paradigm to holistic in the experiential paradigm. The differences in the paradigms suggest the potential for development of an integrated framework. Uzzell (1991) noted that there is no theory-based approach that articulates these four different research strategies. An integrated framework might be able to measure the holistic landscape visual preference in a more systematic way.

Table 2.2
Relationships of Model Elements and Landscape Perception Paradigms (Zube et al. 1982)

	Expert	*Psychophysical*	*Cognitive*	*Experiential*
Human model	Elite, highly-skilled trained observer	Observer as respondent	Observer as processor	Active participant
Landscape properties	From principles of art, design, ecology, and resource management: Form Balance Contrast Character Diversity Ecological principles-diversity Silviculture timber stand improvement Pollution control	Specific landscape properties manipulatable through management and design: Cover Water Topography Structures	Associated with obtaining information and meaning: Mystery Legibility Identifiability Prospect Refuge Hazard	World of everyday experience: Familiarity Social space Landscape style
Interaction outcomes	Statement of landscape quality Enhanced sense of landscape	Numerical or statistical expression of perceived values Related landscapes or landscape features	Meaning Ratings of satisfaction dissatisfaction and preference Stress reduction Adaptation Arousal	Habitual behavior Understanding of human and landscape development Change Statements of landscape taste Enhancement of sense-of-self

Integrated Approach

There have been attempts to measure landscape visual preferences with methods that integrated different approaches. Mudrak (1983) used the 'importance of landscape' and 'sense of place' to identify the *in situ* visual preferences of residents for the landscape. This method combined a structured oral interview method and a map that recorded their environmental behaviors. Schroeder (1991) combined quantitative and qualitative approaches to understand the human response to landscapes. Schroeder combined photo evaluations and open-ended descriptions of the meanings and experiences of their significant places to understand how people experienced an arboretum landscape.

Because of the practicability of the psychophysical approach and the theoretical base of the psychological approach, Daniel and Vining (1983) suggested that the integration of the psychophysical and psychological approaches might provide the best avenue to assess landscape visual preferences. Other researchers have attempted to combine these two approaches. Ruddell et al. (1989) combined psychological penetration, the feeling of seeing through the landscape, with other physical attributes to predict landscape visual preferences. Li (1996) integrated the psychological variables and physical attributes of forest stands into one structure model which proved to be effective. Huang (1998) also combined the physical attributes and psychological variables of water scenes in one predictive model found to explain more variance. Hetherington (1992) combined the physical attributes, psychological variables, and expert formal appraisal into a one structure model. However, in these studies it was assumed that the two approaches (psychological and psychophysical) were independent

and simply combines them without designating a relational order. Since the preference evaluation is based on the perception of physical attributes, the effect of physical attributes (psychophysical) and cognitive perception (psychological) may be confounded.

SUMMARY

A review of theoretical approaches to landscape visual preference research suggests that most of the theory is based on the biological perspective. The prevailing perception-based approaches (psychophysical and psychological) also focus on biological explanations. The effects of human-environment interactions or cultures are seldom discussed. Symbolic meaning and the importance of environment are discussed in the experiential approach and were not considered in those prevailing approaches (i.e. psychophysical and psychological approaches). It has been suggested that biological theories may be misleading because they ignore the meanings and associations that people have for places (Scott & Canter, 1997).

Bourassa (1990) argued that since biology and culture may serve as distinct bases for aesthetic behavior, it is necessary to go beyond both biological and cultural determinism, toward a theory that would fully embrace both biological and cultural factors. Little research has addressed the biological and cultural factors theoretically. Existing efforts are focusing on integrating methodology rather than theory. It is critical to examine the landscape with both biological and cultural considerations. While most of the landscape visual preference theories and models focus on only one aspect of the biological or cultural factors, the symbolic model seems to provide a potential

theoretical structure to integrate biological and cultural perspectives of landscape visual preference.

EMOTIONAL PLACE BONDING

DEFINITION OF EMOTIONAL PLACE BONDING

Jones et al. (2000) suggested that there are two perspectives about one's relationship to landscape. The first is the visual perception of the landscape visual preference framework, where preference is defined as how much an individual likes the scenery being viewed. The other perspective focuses on emotional bonds to landscapes that are acquired through social experiences. Emotional place bonding is a complex phenomenon. Unlike landscape preference or other physical environment concepts, emotional bonds emphasize human involvement. This approach focuses on the concept of places, which gain meaning for individuals, groups and communities through the experience and knowledge of the place.

Riley (1992) proposed that three processes are involved in developing a relationship with a place. First is a biological process similar to the evolution theory of Kaplan and Kaplan (1989), that human beings developed a certain response to place-specific demands leading to the affective feeling towards that type of place. Second, emotional bonds would be formed through long-term interaction between humans and places over time. This emotional bond is influenced by geography and human culture. The third process is the influence of personal experience. Individuals' own lives, bodies, and experiences, such as childhood experiences, play a major role in the development of

emotional bonds. The perspective coincides with Bourassa's (1990) three paradigms for landscape visual preference, which also suggest biological, cultural, and individual levels of development. This also supports the notion that there may be a positive relationship between landscape visual preference and emotional place bonding.

Over the years, researchers have examined emotional and symbolic bonding to places, using related concepts such as rootedness (Chawla, 1992; McAndrew, 1998; Tuan, 1977), topophilia (Tuan, 1974), geopiety (Tuan, 1976), sense of place (Farnum et al., 2005; Shamai, 1991), place attachment (Kyle et al., 2005; Smaldone, Harris, Sanyal, & Lind, 2005; Williams & Vaske, 2003), belongingness (Jones et al., 2000), place identity (Proshansky, Fabian, & Kaminoff, 1983; Twigger-Ross & Uzzell, 1996), place dependence (Stokols & Shumaker, 1981), and place bonding (Hammitt et al., 2006). Giuliani and Feldman (1993) argued that researchers have frequently used these different but related terms, and that "the most important challenge in this area of inquiry is to integrate different viewpoints and approaches" (p. 271). While there are diverse terms and definitions in the literature, the current study follows the definition of Low (1992), a "symbolic relationship formed by people giving culturally shared emotional/affective meanings to a particular space or piece of land that provides the basis for the individual's and groups' understanding of and relation to the environment" (p. 165). The term "emotional place bonding" will be used to represent this idea.

Many researchers have proposed different components for the concept of emotional bonding to a place. For example, Kyle et al. (2005) proposed a tree factors model for place attachment that consisted of place identity, place dependence and social bonding. Hammitt and Stewart (1996) suggested a taxonomy of place bonding including

place familiarity, place belongingness, place identity, place dependence and place rootedness (c.f. Hammitt & Cole, 1998). At lest two dimensions are almost always identified in recent emotional place bonding-related literature (e.g. Bricker & Kerstetter, 2000; Hou, Lin, & Morais, 2005; Hwang et al., 2005; Kyle, Graefe, Manning, & Bacon, 2004; Moore & Graefe, 1994; Williams & Roggenbuck, 1989), place dependence or functional attachment, and place identity or emotional attachment. The former reflects the importance of a place in providing features and conditions that support specific goals, desired activities, or serve instrumental values. The latter refers to the symbolic importance of a place as a repository of sentiments and emotional relationships, and their fulfillment (George & George, 2004). The two constructs are further explained in the following sections.

Place Dependence

Stokols and Shumaker (1981) referred to place dependence as social imageability. Different from the imageability of Lynch (1960), which focuses on the salient physical features of the environment, social imageability focuses on the functional, motivational, and evaluative significance of environments. It is similar to Gibson's (1977) concept of "affordance," which refers to the potential uses of activities the environment suggests to observers by the quality of its physical properties. For example, Stokowski (1996) suggests that meaningful place quality, values, and landscapes were almost irrelevant for amenity-based recreation like gambling. People may develop some kind of functional attachment to a place that provides such opportunities. Jacob and Schreyer (1980) describe such functional meaning of a place as a collection of attributes that allow the pursuit of a primary activity. It emphasizes the contribution of different attributes such

as scenic beauty, entertainment, family fun, etc. However, Williams et al. (1992) indicate that place dependence focuses more on the overall meaning attached to a specific place for enjoying a leisure pursuit than the dominant multi-attribute and functional views of that place.

Stokols and Shumaker (1981) define the concept of place dependence as the degree to which individuals perceive themselves dependent upon a particular place for an activity or reason, based on the value of a place for its "goodness" for scenic enjoyment and so forth. People are likely to evaluate the quality of place by comparing it to the relative quality of comparable places.

The relative quality of alternative places is an important factor for place dependence (Stokols & Shumaker, 1981). Identification of the quality of alternatives is influenced by several factors. Awareness and familiarity about alternatives, mobility, resources, number of needs and type of needs are all important components to evaluate the quality of the alternatives. Therefore, Stokols and Shumaker indicate that people could develop place dependence even though they are not satisfied with that place, as long as there is no better alternative choice.

Research has shown that there is a relationship between a physical environment and emotional place bonding. Korpela (1989) argued that the physical environment was not only a mediator for social interaction, but also has its own importance for an individual. Shumaker and Taylor (1983) reviewed the topic of people-place relationships and pointed out that a neighborhood's physical amenities are important predictors of attachment. Individuals who perceived a current residential environment as satisfying their needs had enhanced levels of attachment to their community. Eisenhauer (2000)

found that environmental features of places are the second important reason for an attachment to special places. Shumaker and Taylor (1983) also suggested that physical singularity, stigma, and physical boundaries are predictors for a group-level attachment; that is, physical uniqueness and a sense of territory would help to build up a sense of attachment to a place. St. John, Austin and Baba (1986) and Feldman (1990) also both suggested that satisfaction with specific community attributes like general physical appearance had a significant impact on social integration and attachment to an individual's residence. Clean, well-ordered neighborhoods have been shown to inspire a high level of attachment even if residents have not lived there a long time and do not have many friends in the neighborhood. People who are satisfied with the physical environment of their communities (i.e., their environmental appearance) tend to be more attached to the communities than those who are less satisfied (Feldman, 1990). Beyond physical dependencies on residential environments, tourists also have shown emotional attachments to physical environments they visit. Brown (1990) found that tourists associated meanings to be related to environments they experienced as similar to places from their childhood; thus these places from their childhood helped them identify with the places they experienced as tourists.

Although place dependence is often referred to as the satisfaction of physical needs, some researchers also include the fulfillment of higher-order personal and group needs such as self-respect or autonomy (e.g. Stokols & Shumaker, 1981), while many others consider the higher-order needs as a second component of affective bond — place identity.

Place Identity

The other dimension of emotional place bonding is place identity, which was defined by Proshansky (1978) as "the dimensions of the self that define the individual's personal identity in relation to the physical environment" (p. 155). Proshansky, Fabian, and Kaminoff (1983) defined place identity more specifically as:

> a sub-structure of the self-identity of the person consisting of broadly conceived cognitions about the physical world in which the individual lives. These cognitions represent memories, ideas, feelings, attitudes, experiences that relate to the variety and complexity of the physical settings that define the day-to-day existence of every human being. At the core of such physical environment-related cognitions is the 'environmental past' of the person; a past consisting of places, spaces and their properties which have served instrumentally in the satisfaction of the person's biological, psychological, social, and cultural needs. (p. 59)

Emotional place bonding plays an important role in the development of a person's cognition, and individuals often identify themselves in terms of affection toward surrounding environmental settings. Further, place identification can be explained as social identity, which represents the membership of a group of people who are in the same location (Twigger-Ross & Uzzell, 1996).

Proshansky's (1978) initial discussion about identity with physical setting was limited to the city. However, it has been expanded to other settings. For example, Feldman (1990) expanded the concept of "settlement-identity" to include "patterns of conscious and unconscious ideas, feelings, preferences, and behavioral tendencies that relate the identity of a person to a type of settlement" (p. 191-192). Brown (1990)

applied the concept to vacations and second homes, proposing that "attachment to a tourism destination is regarded as those dimensions of the self that define the individual's personal identity in relation to places visited as a tourist" (p. 123).

MEASUREMENT OF EMOTIONAL PLACE BONDING

Due to the complex nature of emotional place bonding, there seems to be no common definition of the concept or common measures (Giuliani & Feldman, 1993). Researchers have developed different measurement instruments.

For example, Shamai (1991) created a scale that indicates the level of sense of place an individual might hold. In his study, he examined the relationships between different "nested allegiances" (metro, province, country), sense of place, and the influence of school. He proposed senses of place as having three distinct phases, from low to high, which are: belonging to a place, attachment to a place, and involvement in a place. Each phase was broken down into two levels in the following scale: (1) knowledge of being located in a place; (2) belonging to a place; (3) attachment to a place; (4) identifying the place with goals; (5) involvement in a place; and (6) sacrifice for a place. A (0) was added to the scale to represent the feeling of not having any sense of place. The scale is a seven level ordered measurement within which participants select the most appropriate description for their level of sense of place.

Williams and Roggenbuck (1989) generated a 27 item scale to measure place attachment. A survey of 129 students from four universities resulted in a three-factor measure: a central aspect of life, resource dependence, and place indifference. The place indifference dimension consisted of negative appraisals of the setting and did not reflect

the symbolic or functional meaning of the settings. Therefore, the authors believed that it might be just an artifact of this particular analysis and thus it was not included in the final scale.

Adopting factors of place dependence and place identity, Moore and Graefe (1994) measured place attachment in a rail-trail setting. The result of modifying the measurement showed two dimensions of place attachment: place dependence and affective place identity. Place identity was predicted by the use history, the importance of trail activity, and the level of place dependence, while place dependence was predicted by distance to the trail and use frequency. Williams and Vaske (2003) tested the validity and generalizability of a 12 item scale taken from several previous studies, six for place dependence and six for place identity, and demonstrated that the scale is a valid and reliable measure of what they felt represented the place attachment construct.

While many researchers have used multi-dimensional measurements, some researchers have chosen uni-dimensional measurements. In a study by Stedman (2003a), a single item was used to represent the concept of place attachment to test several models that integrated environmental variables with a sense of place. The single item place attachment measurement, "this is my favorite place to be," was selected because it had the highest loading among his place attachment factors. In another study, Jones et al. (2000) used a single item, "sense of belonging," to measure national park visitors' sense of belonging. They stated that "the concept of sense of belonging is one of a number of similar concepts adopted by researchers to examine affective bonds to landscapes" (p. 386).

SUMMARY

Emotional place bonding research has emphasized the social construction side of perception, and has often overlooked the influences of environmental features. Many have argued the importance of identifying environmental features that contribute to emotional bonds. Some have tackled the issue, but have not identified significant features of the environment (Farnum et al., 2005). How these feelings for places relate to preferences for certain types of landscapes is not well understood.

RELATIONSHIP BETWEEN LANDSCAPE PERCEPTION AND EMOTIONAL PLACE BONDING

According to Farnum et al. (2005) there are two contradictory positions about the relationship between landscape visual preference and emotional place bonding. The first position is that landscape visual preference should be considered separately from emotional place bonding. Although landscapes might contribute to a bonding to place, some assert that visual landscape attractiveness and place attachment are fundamentally different. The other position argues that there are attachment-like or emotional components to visual preference judgments, and therefore they should be considered together. No matter which view is adopted, all agree that there are certain relationships between landscape perception and emotional place bonding. Farnum et al. (2005) even suggests that "visual preferences themselves may be the culmination of different biological, individual, and sociocultural factors." Indeed, there are many similarities between these two concepts. The following will compare these two concepts from different perspectives.

Although landscape visual preference and emotional place bonding seem to have different focuses, one of the goals they have in common is to identify the environments or places important to people and aid in explaining why. Zube et al. (1984) indicate that the fundamental question for landscape visual preference theory is to find out "why some landscapes are valued more than others (, p. 22). Jacques (1980) argued that a landscape visual preference assessment would not be complete without assessing the importance of a landscape. On the other hand, places associated with strong emotion must be important. For example, Farnum et al. (2005) suggest that emotional place bonding is the "importance individuals attach to places" (p. 1). Gustafson (2001) used personally important places to examine the meanings of places. Landscape visual preference and emotional place bonding appear to have similar goals: to understand the importance of place.

Researchers also suggest there might be some overlap between landscape visual preference and emotional place bonding. Daniel (2001b) indicated that emotional place bonding has become a topic within landscape visual preference research; "the human perception component of the interactional landscape quality construct has been expanded to subsume concepts such as landscape meaning and sense of place." For example, Costonis' (1989) cultural stability-identity theory argued that aesthetic values are reflections of groups' desires to protect their identities. In a study of the restorative favorite place, Korpela (1996) reported that compatibility is an important characteristic of the favorite place, which is operationalized as "I have a sense that I belong here." Therefore, Berleant (1997) suggests that a radical rethinking of traditional landscape aesthetic theory is needed, that "the value is measured less from formal traits than by

perceptual immediacy and intensity in enhancing the intimate bond of person and place" (p. 36).

Several recent studies have found a correlation between landscape visual preference and emotional bonds For example, Jones et al. (2000) examined the relationships between visual preference, and photo-based and verbal measure of belonging, when testing the construct validity of measures of visitors' sense of belonging to the pinnacle Overlook in Cumberland Gap National Historic Park. They found the photo-based measures of visual preference and belonging were highly correlated, while the verbal measure of belonging was positively, but not highly, correlated with either photo-based measure. Kaltenborn and Bjerke (2002) tested the association of landscape preference of 24 pictures and the general attachment to the place. They found a positive association between place attachment and landscape preferences, which showed respondents who have higher attachment to the place also expressed higher preference to the landscape in the pictures taken form the place. Galindo and Hidalgo (2005) found that aesthetic preference for a city was clearly linked to its recreational sites and the city's historical-cultural identity. They concluded that the function and cultural representation of a particular scene seem to constitute two important dimensions of aesthetic preference. Related support is found in Ryan's (1998) study about river corridor landscapes, in which it is found that new residents preferred more remote natural areas while long-time residents preferred surrounding landscapes. While preference of natural environments has been identified as a common phenomenon (Buhyoff et al., 1978; Craik & Zube, 1976; Daniel & Boster, 1976; Daniel et al., 1973; Kaplan & Kaplan, 1989; Kaplan et al., 1998; Newell, 1997; Ribe, 1989; Shafer & Brush,

1977; Sullivan, 1994; Zube, 1974), Ryan's study provided evidence for change in landscape preferences from general environments toward environments with special meanings due in part to length of residency. Although these studies have provided empirical support for the relationship between landscape preference and emotional place bonding, none of them has provided a theoretical explanation or a clear model for such relationships.

Stokols and Shumaker (1981) suggested some time ago that the environment is a composite of physical and symbolic features. They also indicated that environmental researchers rarely consider these two elements in the same analysis. An attempt has been made to integrate the objective physical features (landscape aesthetics) and subjective symbolic features (emotional place bonding) in this study.

CONCEPT GENERATION AND RESEARCH QUESTIONS

The literature review suggests that landscape visual preference research has emphasized biological explanations at the expense of those related to cultural and human experience, while emotional place bonding research has emphasized cultural-social constructions and overlooked the environmental features. The effects of some cultural variables have been identified (e.g., familiarity, typicality, or label effect), but few attempts have been made to fit them into the biological explanations. It appears that the symbolic aesthetic structure provides an appropriate framework for integrating biological and cultural perspectives, since it includes major components of landscape visual preference. It seems reasonable to suggest that emotional place bonding and landscape visual preference are conceptually related.

Two basic objectives will guide this study: 1) better understand the relationship between specific landscape characteristics and the emotional bonds people form with landscapes, and 2) understand if and how the relationships between formal landscape aesthetics and emotional bonding with a place predict visual preference for a landscape. Based on these research objectives, the following two research questions will guide the investigation.

1) WHAT IS THE RELATIONSHIP BETWEEN AESTHETICS REPRESENTED BY THE PHYSICAL LANDSCAPE AND THE EMOTIONS THAT BOND PEOPLE TO THAT LANDSCAPE?

Linking the construct of emotional place bonding with perception of physical landscape elements is needed to help develop a more complete understanding of how people relate to landscapes/places. Many researchers have indicated that the quality of physical environment might foster certain feelings about a place (e.g. Feldman, 1990; Schroeder, 2000; Shumaker & Taylor, 1983; St. John et al., 1986; Stokols & Shumaker, 1981). However, most questions have addressed the way that feelings about a landscape had developed over a long-term interaction. It is not clear how landscape quality would influence people's feelings about an environment they had not had much exposure to, especially to a new place that has never been visited.

Farnum et al. (2005) argue that interacting with place may be more of a psychological process than one of physical contact (p. 15). In other words, it is not necessary for people to interact with a place physically in order to have a strong affective linkage with that place. People may associate strong emotions with imagined places,

based on memories of how another place they know looked (Schroeder, 2004). People have never been to some places they view, but they are likely to associate emotions with certain landscape elements, and transfer such emotions to a new place when that place has similar elements to places they are familiar with and/or for which they have feelings. The process is similar to schema discrepancy theory for landscape preference. That is, people have a schema of places that they associate with a strong emotion, and then have different levels of affective associations to new places, depending on how these new places fit in their schema. For example, Jones et al. (2000) suggests that people may bond to a new place emotionally when the new place "looks and feels like home many miles away" (p. 386). Hence, how a place looks is likely to elicit some level of emotion whether or not it is a place one has directly experienced. This does not mean that physical appearance of the new place shapes the emotion bonding to the place. The bonds preexist in that they reside with the person based on some previous association and experience with a place. The physical appearance helps emotions to surface and some level of bonding is then related to the landscape being viewed.

Kaplan and Kaplan's (1989) cognitive approach was adopted in this study as a way of measuring aesthetic perception. Four informational variables of Kaplan and Kaplan's information-processing theory that represent landscape characteristics and composition (defined here as aesthetics) will be used to predict emotional place bonding.

- Hypothesis 1: Significant variation in emotional place bonding will be explained by perception of landscape aesthetic components.

A hypothesized model suggests that emotional place bonding will be predicted by these four information variables (see Figure 2.5). That is, perceptions of the physical

landscape elicit different levels of bonding to a place. The relative contribution of the information variables will be compared.

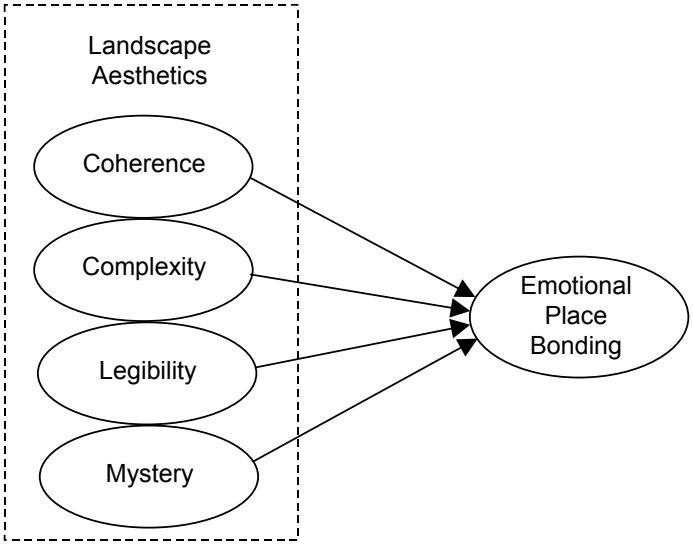

Figure 2.5 Hypothesized Model for Linking LA and EPB

2) HOW CAN EMOTIONAL PLACE BONDING BE INCORPORATED WITH LANDSCAPE AESTHETICS AS AN INTEGRATED MODEL OF LANDSCAPE VISUAL PREFERENCE?

Many researchers have suggested that true landscape visual preference consists of both formal landscape aesthetics and emotional/symbolic aesthetics (e.g. Lang, 1987; Nasar, 1997; Porteous, 1996; Rapoport, 1977). The formal aesthetics refer to the physical properties that create complexity, legibility, coherence and mystery, and the emotional/symbolic aesthetic reflects the appreciation of the meanings or values of the

environment. Both formal and symbolic aesthetics are the mediating variables of human environmental experience (Nasar, 1997). Symbolic aesthetics are created by learned experiences acquired from interaction with the environment. These symbolic attributes are related to, but not defined solely by physical attributes (formal aesthetics) (Nasar, 1994). These symbolic attributes are also believed to be the stuff of which emotions are made and that they work to mediate the effect of formal aesthetics (Nasar, 1997).

There is similarity between the constructs of emotional place bonding and symbolic aesthetics. Some researchers believe the emotional bonding is a symbolic connection to the place. For example, emotional place bonding itself is suggested to be a "symbolic relationship" between people and places (Low, 1992). Williams et al. (1992) also suggest that place attachment provides "an emotional and symbolic view of places" (p. 30). Therefore, it is reasonable to believe that emotional place bonding contributes to the symbolic aesthetics of the place.

Based on this dichotomized concept of formal and symbolic aesthetics, Nasar (1994) proposed a symbolic model that further differentiated the symbolic aesthetic into denotative and connotative meanings (see Figure 2.6). Denotative meanings refer to the judgments of what an environment is, such as a church, a theme park, or a national park. It is the meaning that people give to a place. Connotative meanings reflect the inference of the evaluative and affective qualities of an environment. In other words, it is the value or emotion that people associate with an environment or associate with its meaning.

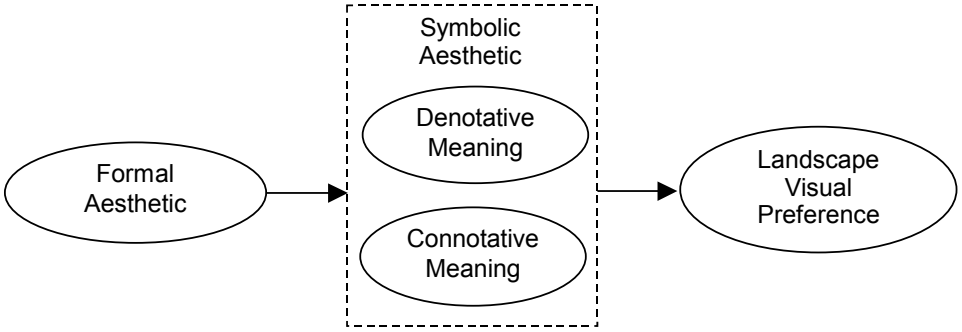

Figure 2.6 Symbolic Model (after Nasar, 1997)

The meaning of a place has been suggested to be an important factor for emotional place bonding (Farnum et al., 2005; Stedman, 2002, 2003a, 2003b). For example, Stedman (2003b) argues that people "attribute meaning to landscapes, and in turn become attached to the meanings themselves" (p.823). In Nasar's symbolic model, the concept of denotative meaning actually indicates the meaning of a place. Connotative meanings often reflects the evaluative and affective quality of environment, which is very similar to the idea of emotional place bonding. The similarity further suggests that emotional place bonding is a component of symbolic aesthetics along with typicality. A model for this study is proposed based on Nasar's symbolic framework (see Figure 2.7). To ensure consistency in terminology, the formal aesthetic in the symbolic model is termed landscape aesthetic. The hypothesis that underlies the model is described below.

The hypothesized model suggests that symbolic aesthetics, which includes EPB and the meaning of a place (i.e., place label and typicality), mediate the influence of landscape aesthetics on a true visual preference for a landscape (or LVP). The effect of

landscape aesthetics (physical landscape elements) on LVP (path a, Figure 2.7) has been well supported in studies about the effect of physical elements on LVP (e.g. Chon, 2004; Gifford, 2002; Kaplan et al., 1989; Stamps, 2004) and biologically based landscape preference theories (Bourassa, 1991). A hypothesis was developed based on these concepts.

- Hypothesis 2: There will be a significant positive relationship between landscape visual preference and perceived landscape aesthetic.

The meaning of place has been suggested to have effects on emotional place bonding. Williams et al. (1992) have also suggested that people may attach their feelings to a specific meaning of place (such as the wilderness). Stokols and Shumaker (1981) indicated that physical elements of a place convey its affordances (i.e., functional meanings) for different occupants, and occupants will form attachments to the place differently, according to affordances. The relationship between landscape aesthetics (physical setting), denotative meaning (place meaning), and connotative meaning (EPB) have been put forth by Stedman (2003a), who suggested that place meaning is the mediator between physical setting and place attachment (path b and d, Figure 2.7). In other words, people associate different meanings with a place with different physical appearances, and people have different levels of attachment to these places with different meanings. The proposition of path d is that denotative place meaning will influence EPB (as connotative meaning). Since place meaning was operationalized as place label and typicality, two hypotheses were proposed for both variables (Hypothesis 5 and 6).

Except when mediated by the meanings of a place, physical elements may induce emotions for a place stemming directly from previous experience (path c, Figure 2.7), as

proposed in Research Question 1. Therefore, the landscape aesthetic was also hypothesized to influence emotional place bonding.

- Hypothesis 3: Place meaning, as measured by the place's typicality to a national park, will be significantly and positively related to perceived landscape aesthetics.
- Hypothesis 4: Emotional place bonding will be significantly and positively related to perceived landscape aesthetic.
- Hypothesis 5: Emotional place bonding will be significantly and positively related to perceived meaning of a place, as measured by the place's typicality to a national park.
- Hypothesis 6: There will be significant differences among the emotional place bonding for landscape scenes labeled differently.

The effects of denotative place meaning on LVP (path e, Figure 2.7) have been supported by studies on place label (Anderson, 1981; Daniel et al., 1973; Hodgson & Thayer, 1980) and studies on typicality (Hagerhall, 2001; Herzog & Stark, 2004; Peron et al., 1998; Purcell, 1992). These studies have suggested that the labels placed on a landscape (e.g., national park, neighborhood park, etc.) and the similarity of a landscape to its stereotype (e.g., desert, mountains, etc.) will influence one's preference for a landscape.

- Hypothesis 7: Landscape visual preference will be significantly and positively influenced by perceived place meaning, as measured by the place's typicality to a national park.
- Hypothesis 8: Landscape visual preference will differ significantly among landscapes with different labels.

The effects of connotative meaning (EPB) to LVP (path f, Figure 2.7) were based on the arguments of Lowenthal (1978), Costonis' (1982), and Farnum et al. (2005) about the attachment-like effect on LVP. The studies of Kaltenborn (2002) and Jones et al. (2000) provide empirical support for the relationship between preference and people's emotional attachment.

- Hypothesis 9: Landscape visual preference will be significantly and positively influenced by emotional place bonding

The six hypotheses aforementioned cover all paths in the hypothesized model. However, these hypotheses also suggest the mediator roles of place meaning and emotional place bonding. Without these partial mediation effects, the hypotheses could not all be supported simultaneously in one model. For this reason, four mediating relations were hypothesized.

- Hypothesis 10: The relationship between landscape aesthetic and landscape visual preference is mediated by emotional place bonding.
- Hypothesis 11: The relationship between landscape aesthetic and landscape visual preference is mediated by place meaning, as measured by the place's typicality to a national park.
- Hypothesis 12: The relationship between landscape aesthetic and emotional place bonding is mediated by place meaning, as measured by the place's typicality to a national park.
- Hypothesis 13: The relationship between place meaning, as measured by the place's typicality to a national park, and landscape visual preference is mediated by emotional place bonding.

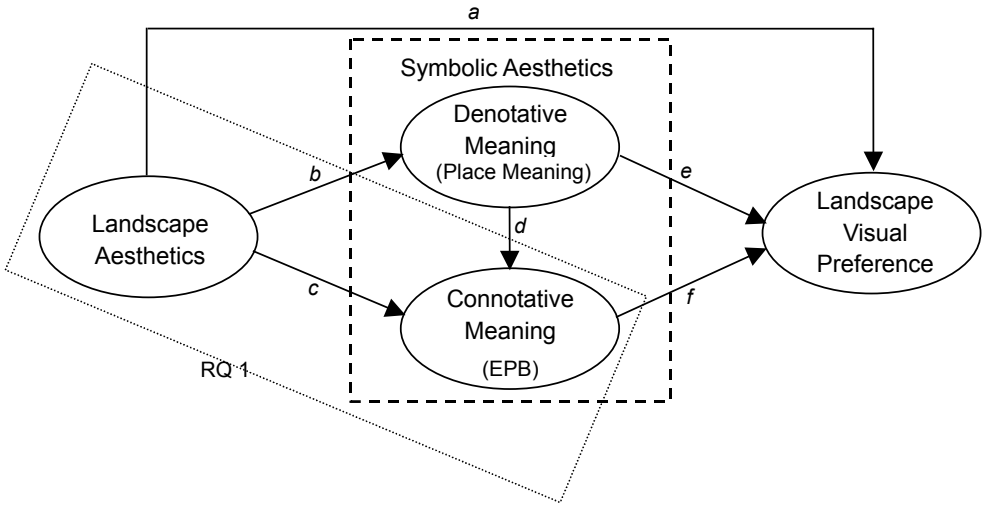

Figure 2.7 Hypothesized Integrated Model of LVP

CHAPTER III
METHODS AND PROCEDURES

This chapter describes the research methods used to examine the research questions proposed in the previous chapter. This chapter is organized into four sections. The major constructs used in this study are presented in the first section. The second section presents the preparation of visual stimulus. In the third section addressed the measurement used in the study. Section four outlines survey procedures and analysis.

RESEARCH DESIGN

This study intends to understand respondents' preferences and emotional responses to different landscapes. A laboratory-like experimental design was applied, which used photographs of landscapes as stimuli to elicit participants' responses. An on-line survey was used to assess participants' responses. Participants judged randomly selected landscape pictures in random orders and with randomly assigned place labels, all of which will be further explained later in this chapter.

Compared to field/survey design research, which examines the relationship of variables in natural settings, laboratory experiments control treatments so that researchers can better identify variables causing certain effects. It is very hard to manipulate variables in a natural setting. Controlling variables is more difficult in natural settings because onsite experiences may be affected by many factors such as climate, view angle, or other people nearby. Research on visual preferences can also be difficult because appropriate settings may not be available, the size of the project may

make it uneconomical, and sufficient control may not be attainable (Chon, 2004). Therefore, many researchers have tended to use surrogates which make control of these factors possible.

Another reason to use laboratory research rather than field research is to prevent a recursive effect. Literature has suggested that a high environment quality may help to develop emotional bonds to the environment. Therefore, the causality between landscape visual preference and emotional place bonding may not be easy to distinguish (see Figure 3.1). However, the development of emotional bonds usually requires long-term interaction with a place. This study used photographic surrogates instead of real places and participants had no previous experiences with the places depicted. It was not possible for participants to develop emotional bonds with these virtual places in such a short period of time, so landscape preferences should not be influenced by the development of emotional bonds. The emotional feelings associated with virtual places can only be induced by landscape pictures were the viewers' past experiences come into play. Therefore, we can assume that, in this research design, landscape preference is affected by emotional place bonding and not the reverse.

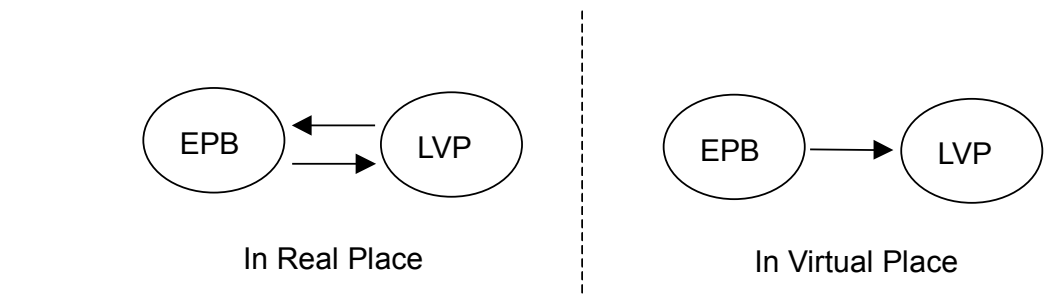

Figure 3.1 The Relationship Between EPB and LVP in Real Place and Virtual Place

The validity of using different simulation techniques in landscape research has been discussed in several studies (e.g. Bishop & Leahy, 1989; Daniel & Boster, 1976; Daniel & Meitner, 2001; Palmer & Hoffman, 2001; Pitt & Nassauer, 1992; Rohrmann & Bishop, 2002; Shafer & Richards, 1974; Tyrvainen & Tahvanainen, 1999). Although on-site landscape experiences have been suggested to cover a more comprehensive feeling than simulation (Hull & Stewart, 1992; Kroh & Gimblett, 1992), many researchers have suggested that photographs or slides can be valid surrogates for real landscape. For example, the preference rating for landscape slides has been shown to have a strong relationship ($r=0.86$) to actual natural environments in a meta-analysis of 13 different studies (Stamps, 1990). Researchers have also shown that viewing nature pictures has other physiological effects (e.g., relaxation) which are similar to the experience of natural environments (Ulrich et al., 1991). Computer-based environmental simulations which show landscape images on a computer monitor, rather than on slides or photographs, can be an appropriate method by many landscape researchers (Orland, 1993). Many laboratory psychological experiments have been conducted using computers, so Internet-based experiments were believed to have an accepted level of reliability and validity over time (Reips, 2002). Recently, the application of web-based surveys for landscape visual preference has been tested to be both valid and reliable (Roth, 2006; Wherrett, 2000). This study used online surveys rather than paper-based surveys in order to have better control of the time and the sequence of the surveys given. With the help of computer codes, survey web pages can become “interactive” with respondents and the assignment of different treatments to respondents is possible.

VISUAL STIMULUS

Pictures were taken in Big Bend National Park in the United States and Kenting National Park in Taiwan. National parks were selected to be the research places because landscape beauty is considered to be one of the most valuable assets of national parks (Pavlikakis & Tsihrintzis, 2006). The reason for using national parks from different countries was to increase the variance of emotional place bonding and familiarity. It was assumed that respondents would be more familiar with landscapes represented by the national park in the US, and therefore have stronger emotional bonds.

Pictures were selected from two sources in an effort to represent the place as it is experienced by the majority of visitors. A large number of pictures were taken by the author at major points in each park. There were 1,313 pictures taken at 226 sites in Big Bend National Park, and 1,636 pictures taken at 249 sites in Kenting National Park. The pictures served as the picture pool, and 250 pictures (125 pictures for each site) were selected for the next step. These 250 pictures were selected to cover various landscapes in order to increase variance.

In order to reduce the influence of subjective preference to the picture selection and increase the landscape variance, an original procedure was conducted. Four judges with landscape visual analysis training were invited to judge the 250 pictures. A website was created to show these 250 pictures at a resolution of 800*600 pixels, so all of the judges could rate the pictures at the same time. The judges were asked to judge the landscape pictures on their mystery, complexity, legibility, coherence, and overall landscape quality. The judgments were ranked from 1 (the lowest) to 100 (the highest).

After the judges finished all their ratings, these five variables were averaged across the judges. A hierarchical cluster analysis was conducted to group the pictures into 15 clusters for each national park, according to the average values of the five variables. Cluster analysis was used to group similar landscape pictures, and to increase the difference between the selected landscape pictures. One picture was selected from each cluster. The criterion for picture selection was to have the shortest distance to the cluster center, as representative of each cluster. Finally, 30 pictures (15 for each national park) were selected for use in the study. In order to avoid fatigue effects while maximizing the variance of variables of interest, each participant rated 24 pictures (12 for each park) that were selected from the 30 pictures. Stamps (1992) found out the mean and mode of pictures used in 114 environmental studies were 23 and 10. Therefore, using 24 pictures was within that range and judged to be a reasonable number of pictures for this study.

The selected pictures were digitized at a resolution of 800*600 pixels. Research has shown that this picture size would fit 95% of general users' computers (Roth, 2006), reducing potential problems participants might have when attempting to view the scenes and complete the questionnaire.

MEASUREMENT

A questionnaire was developed and administered to all participants. The questionnaire consisted of two sections. The first section of the instrument included seven demographic measures. These items questioned the participants on their age, gender, university major, whether or not they had professional design training, and if

they were color blind. The second section measured participants' responses to the pictures. Each picture had four sets of questions that measured emotional place bonding, landscape preference, landscape aesthetic, and denotative place meaning. These sets of questions are explained below.

LANDSCAPE VISUAL PREFERENCE

The first set of questions was intended to measure participants' visual preferences for the landscapes represented in each picture. Two different types of preference judgments were needed. The first was the overall preference that inquired as to how much the participant liked the landscape in the scene (see Table 3.1). This item has been used in several different studies (e.g. Hammitt, 1981; Herzog & Kropscott, 2004; Purcell et al., 1994). The second question was adapted from the measurement of Scenic Beauty Evaluation (Daniel & Boster, 1976; Li, 1996), which measures the scenic quality of each landscape.

Table 3.1
Summary of Measurements

Factors	*Variables*	*Item Wording*	*Source*
Landscape Aesthetics	Mystery (MY)	● How much do you think the environment promises more to be seen if you could walk deeper into it?	(Herzog & Gale, 1996)
	Complexity (COM)	● How much is in the scene to look at?	(Herzog & Gale, 1996)
	Coherence (COH)	● How easy is it to structure and organize the scene?	(Herzog & Gale, 1996)
	Legibility (LE)	● How easily you can tell what is being depicted in the scene?	(Herzog et al., 1982)
Place Meanings	Typicality (TYP)	● How much does it seem like a typical (*place label*)? ● How much does it seem like a typical National Park?	(Hagerhall, 2001; Herzog & Stark, 2004)
	Place Label	● National Park, Local Park, Scenic Area, Commercial Recreation Area	
EPB		● I feel the setting in the scene is a part of me (PI1) ● I identify strongly with the setting in the scene (PI2) ● I am very attached to the setting in the scene (PI3) ● The setting in the scene is the best place for what I like to do (PD1) ● I get more satisfaction out of visiting the setting in the scene than any other (PD2) ● Doing what I do at the setting in the scene is more important to me than doing it in any other place (PD3)	(Williams & Vaske, 2003)
LVP		● How much do you like the setting in the picture?	(Hammitt, 1981; Herzog & Kropscott, 2004; Purcell et al., 1994)
		● Please rate the scenic beauty for the scene in the picture	(Daniel & Boster, 1976; Li, 1996)

LANDSCAPE AESTHETIC

The second set of questions asked participants to judge the landscape aesthetic (formal aesthetic) according to Kaplan and Kaplan‘s (1989) four information variables, e.g., complexity, mystery, coherence, and legibility. These four variables are suggested by Stamps (1994) to indicate formal variables in landscape perception. The questions were derived from 18 studies, which were reviewed by Stamps (2004) in a meta-analysis of 61 related articles. Landscape perception research often uses single items to measure different concepts because respondents usually have to answer the same question repeatedly in response to different stimuli. Peter (1979) has noted that too many items may bore respondents and reduce validity. Gardner (1998) proposed that one “good” item is better than many “bad” items in terms of reliability and validity. Asking respondents to react to multiple photographs on several scales raised concerns about respondent fatigue and completion of the survey. Given arguments made by others single item measurements were used to measure the four information variables representing to landscape aesthetic.

The questions of complexity, mystery, and coherence were adapted from the study of Herzog and Gale’s (1996). The question for complexity is “How much is there to look at?” The question used for mystery is “How much do you think the environment promises more to be seen if you could walk deeper into it?”. The question for coherence is “How easy is it to structure and organize the scene?” The question for legibility is “How easily you can tell what is being depicted in the scene?” (Herzog, Kaplan, & Kaplan, 1982).

DENOTATIVE PLACE MEANING

The third set of questions measure the meanings of the place (the denotative meaning). The meanings of the place were measured by typicality, and also by randomly assigned place labels. Place labels reflect the abstract meanings assigned by people (e.g., national park, commercial recreation area), which are independent of the physical environment. Typicality was measured by asking the similarity of a landscape to what respondents think a national park should look like. An additional disguised question was asked about the typicality of the landscapes to the assigned labels (i.e., local park, scenic area, or commercial recreation area), when the assigned label is not "national park." The latter typicality question was added simply to reduce respondents' suspicion about asking the typicality to a national park when it was not labeled as a national park.

EMOTIONAL PLACE BONDING

The third set of questions measured participants' emotions associated with the landscapes. The adapted Williams and Roggenbuck's (1989) place attachment scale, which consists of place identity and place dependence dimensions, was used to measure emotional place bonding. As mentioned in the Chapter II, researchers have suggested different dimensions for the concept of emotional place bonding, with place identity and place dependence being identified most often in the literature. Adapting the scale may not cover the full meaning of emotional place bonding, but it is likely to cover the most basic consensual meanings of EPB. The place attachment scale by Williams and Roggenbuck (1989) may be one of the most well accepted measurements for, what is being termed, emotional place bonding in this study. The scale has been adapted in

different studies (e.g. Kaltenborn & Bjerke, 2002; Kruger & Jakes, 2003; Kyle, Bricker, Graefe, & Wickham, 2004; Kyle et al., 2005; Moore & Graefe, 1994; Moore & Scott, 2003), and also has been tested multiple time yielding a valid and reliable measure (Williams & Vaske, 2003). Since the scale would be used repeatedly for rating different pictures, the questions used must be concise in order to prevent respondent fatigue and a halo effect (Peron et al., 1998). With a long questionnaire, respondents are easily bored (fatigue effect) or answer the questions based on their previous responses rather than based on the stimuli (landscape pictures). Peter (1979) suggests that a subset of scale items that have high covariance may be used to prevent the fatigue effect. Therefore, the six highest loaded items were adapted from William and Vaske's (2003) measurement (see Table 3.2). Three items measured place identity and three items measured place dependence. The factor-loading of these items ranged from 0.78 to 0.90 for place identity and 0.69 to 0.93 for place dependence in seven different locations in their study. Similar item-reducing methods have been used with success in studies by Petrick (2002) and Stedman (2003a).

SAMPLE

The eighty-nine subjects who participated in the study were recruited from students at Texas A&M University. The students were from more than 30 different majors and were all involved in undergraduate level courses in the department of Recreation, Park & Tourism Sciences, and Landscape Architecture. While a total of 122 students were contacted, the response rate was about 73%. Because the purpose of this study is to test the effectiveness of the hypothesized model, the participants chosen in

this study were not intended to represent any specific subset of the population, although some studies have suggested that student samples are not significantly different from the general population in terms of landscape preference. Researchers have suggested that a representative sample is not mandatory in experimental studies (Henshel, 1980; Martin & Sell, 1979). A relatively homogeneous group is often preferred in experiments so that any differences found can be attributed to the various treatments, rather than to differences in the subjects (Havitz, 1987). Consequently, the student sample is believed to be appropriate for this study.

Table 3.2
Average Factor Loadings of Williams and Vaske's (2003) Place Attachment Scale

Place Identity	*Mean*	*Place Dependence*	*Mean*
I feel X is a part of me	**0.83**	**X is the best place for what I like to do**	**0.77**
X is very special to me	0.79	No other place can compare to X	0.74
I identify strongly with X	**0.87**	**I get more satisfaction out of visiting X than any other**	**0.87**
I am very attached to X	**0.84**	**Doing what I do at X is more important to me than doing it in any other place**	**0.86**
Visiting X says a lot about who I am	0.67	I wouldn't substitute any other area for doing the types of things I do at X	0.74
X means a lot to me	0.79	The things I do at X I would enjoy doing just as much at a similar site	0.22

NOTE: the items used in the study are in bold

Researchers have indicated that the unit of analysis in psychological experience study can be person-level or situation-level (Larson & Delespaul, 1992). Person-level data uses subject as unit of analysis, and situation-level uses individual self-report as unit of analysis. Many landscape perception studies tended to use situation-level data, in

which each respondent was asked to provide multiple responses to different landscapes. Stamps (1992) found that the mean of the respondent samples size in 114 environmental studies was 243 and the mode was 100 (p. 220). Through a bootstrap investigation, Stamps (1992) concluded that a split-block correlation could be 0.90 or higher for environment preference rating research with 25 to 30 respondents. Using this criteria, the sample size of this study can be considered to be reasonable. Stamps (1996) also indicated that 40 respondents and 20 stimuli (pictures) would be required for the effect size of 0.01 at α=0.05, β=0.20. Therefore, this study which had 89 respondents and 24 landscape pictures can be considered to be somewhat more powerful than what Stamps (1996) suggested would be adequate. However, Larson and Delespaul (1992) indicate that the chance of making type I error would increase when using situation-level data, and one of the remedies is to raise the statistic significance level (α) as 0.01.

Although the unit of survey is a person for this study, the unit of analysis is the rating for each landscape picture. Therefore, the total number of cases for analysis is 2,142. Since SEM was the major analysis tool used in this study, having an adequate sample size for SEM was of concern. Opinions as to the minimum sample size necessary for SEM analysis vary widely. The recommendation for minimum cases has been as low as 100 to as high as 5000 in literature dedicated to the topic (Schumacker & Lomax, 2004). Kline (2005) suggested that a sample size less the 100 is acceptable for most SEM analyses. Improper solutions are more likely to occur for CFA models when there are only two indicators per factor and sample sizes less than 100-150 cases (Kline, 2005, p. 178). Loehlin (2004) suggested that a model with two to four factors should have at least 100 cases, with 200 being preferred. Kline (2005) suggested that a sample size less

than 100 cases would be considered “small”, while sample sizes that exceed 200 cases could be considered “large.” Therefore, 2,142 cases should be adequate for SEM analysis according to the literature.

DATA COLLECTION PROCEDURE

All of the participants were recruited from undergraduate classes. After a brief introduction to the study students who volunteered were asked to leave an email address or to pick up a slip of paper with a link to the online survey. An electronic link was sent to those who left email address. Participants then could link to the survey pages from anywhere and at anytime.

The questionnaire was designed to be self-guided. Instruction pages were provided for each section to provide a consistent guide across respondents. Before participants rated the scenes, five pictures selected from the picture pool were displayed to help participants form a baseline of judgment. After baseline pictures, a sample questionnaire page was also displayed to familiarize respondents with the survey instrument.

Respondents rated two sets of 12 pictures each: one of Big Bend National Park in their own country, and one of Kenting National Park in Taiwan. All of the pictures and questions for a picture were shown in individual pages to reduce the chance of interrelationship between picture ratings (Larson & Delespaul, 1992). In order to control for order effect (Daniel & Boster, 1976), the sequence for showing the pictures was assigned randomly for each respondent. Each picture was shown for 5 seconds to control the stimulus input (Peron et al., 1998; Purcell, 1992). All respondents recorded their

judgments after the pictures were shown. They were asked to evaluate the visual preferences and level of emotional place bonding for each scene. The pictures from Big Bend National Park were labeled “national park,” while the pictures from Kenting National Park were assigned with place labels that selected randomly from “national park,” to “local park,” “scenic area,” and “commercial recreational area.” After viewing all the pictures in a set, respondents were asked to evaluate the overall visual quality and emotional place bonding to the place depicted (see Figure 3.2).

In order to reduce the dropout rate and the negative impact of dropout, the data collected was saved into the database when participants finished their ratings for each picture (Roth, 2006). Therefore, even when participants did drop out, their previous data could be kept for analysis. A reminder system was also used to remind participants about the questions missed, in order to prevent missing values.

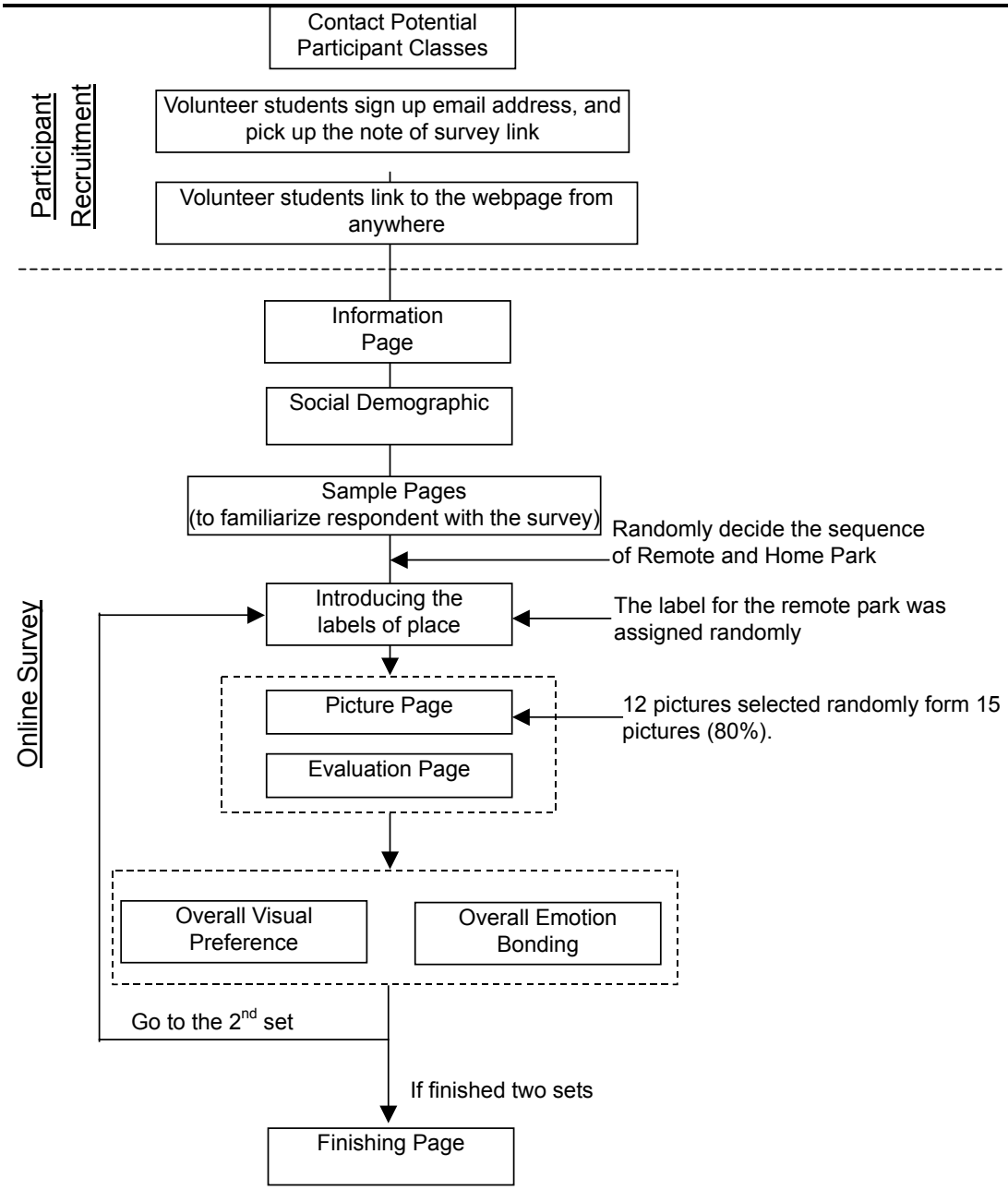

Figure 3.2 Survey Procedure

STATISTICAL APPROACHES FOR HYPOTHESES TESTING

In order to examine the proposed hypotheses and to describe the research sample, the computer software packages Statistical Package for the Social Sciences (SPSS) and Analysis of Moment Structures (AMOS) were used. Since the study used responses instead of person as unit of analysis, the alpha level of 0.01 was adopted to reduce the chance of making type I error (Larson & Delespaul, 1992).

Multiple regression was used to test the relationship between landscape aesthetics and emotional bonding (H1). Regression allows one to assess how well independent variables (level of landscape aesthetics in terms of its four components: complexity, mystery, coherence, and legibility) predict the dependent variable (level of emotional place bonding). Multiple regression was also used to confirm the mediator role of variables (typicality and EPB) in the integrated model following the procedure suggests by Baron and Kenny (1986).

Analysis of variances (ANOVA) was employed to examine the differences between different place labels in terms of respondents' level of EPB (H6) and LVP (H8), and to describe responses between different respondent groups. ANOVA is a statistical tool to compare the differences between two or more groups of means. In order to examine the differences between each pair of groups, a post hoc test conducted via a REGWQ procedure was conducted. The REGWQ procedure was used because it has a tight control over a type I error, and has been suggested to be the best procedure for testing all pairs of means (Field, 2000).

The goodness of the integrated model was tested using structural equation modeling (SEM) technique (H2 to H5, H7, H9 to H13). SEM allows one to examine the

theoretical models that specify causal relationships between several observed and latent variables. The goodness of the hypothesized model fitting the empirical data was judged using the goodness-of-fit indices. The goodness-of-fit indices that used in this study were comparative fit index (CFI), goodness of fit index (GFI), and the root mean square error of approximation (RMSEA). GFI compares the difference between the hypothesized model with no model at all, while CFI compares the hypothesized model with the independence model (Byrne, 2001). Bentler (1990) suggests the CFI should be the index of model choice. RMSEA provides the information about "how well would the model, with unknown but optimally chosen parameter values, fit the population covariance matrix if it were available" (Browne & Cudeck, 1993, p. 137-138) (c.f. Byrne, 2001). RMSEA is also recently recognized as one of the most informative criteria for structureal modeling (Byrne, 2001). The general accepted values for each of these indices are (1) RMSEA values are unacceptable when >0.10 (MacCallum, Browne, & Sugawara, 1996), (2) CFI and GFI greater than 0.95 (Byrne, 2001).

CHAPTER IV
SAMPLE CHARACTERISTICS AND DESCRIPTIVE STATISTICS

The purpose of this chapter is to summarize the results from the study. This chapter presents three main sections. The first section presents descriptive statistics regarding participants. The second section presents descriptive statistics and scale reliability for the landscape characteristics, i.e., LVP, EPB, and denotative place meanings (typicality, and place labels). This section also reports and discusses the results of the difference between the different respondents. The third section tested the effects of place labels on participants' responses to the landscape.

SAMPLE CHARACTERISTICS

The 89 participants that made up the sample were all selected from students in undergraduate level courses in the departments of Recreation, Park and Tourism Sciences and Landscape Architecture. The characteristics of the participants are shown in Table 4.1. The participants were generally homogeneous in age, ranging from 19 to 30 years, and more than 80% of the participants were between the ages of 20 and 23 years. Relatively more of the participants were male than were female. About 60% of the participants, 55 persons in total, were male. About 25% of the participants indicated that they had received education in design or some type of training related to aesthetic quality. This question was asked to determine if there was any relationship between aesthetic training and evaluation of landscapes, because research has suggested that professional training could influence landscape evaluations.

Table 4.1
Characteristics of Participants

	Person	*%*
Gender		
Male	55	61.8%
Female	34	38.2%
Age		
30	1	1.1%
28	1	1.1%
27	1	1.1%
25	3	3.4%
24	3	3.4%
23	15	16.9%
22	22	24.7%
21	23	25.8%
20	14	15.7%
19	4	4.5%
Missing	2	2.2%
Design Training		
Yes	22	24.7%
No	67	75.2%
Color Blind		
Yes	1	1.1%
No	88	98.9%
Total	89	100.0%

LANDSCAPE CHARACTERISTICS

SUMMARY OF RESPONSES TO DIFFERENT PICTURES

Because each participant evaluated 24 pictures (80%) that were randomly selected from the picture pool (30 pictures), the number of evaluations for each picture were examined to confirm that pictures were equally assigned to the various participants. The numbers of evaluations for landscape pictures ranged from 55 to 86 evaluations (see

Table 4.2). Each picture was expected to have 71.4 evaluations if participants were assigned equally. A chi-square test shows that the number of evaluations for each picture did not significantly depart from the expected number of evaluations (chi-square=35.2; df=29; p=0.19). The results show that the online survey instrument successfully assigned pictures to participants, and that each picture was equally weighted. That is, each picture had an approximately equal contribution to the analyses performed.

The study depended largely on participants' responses to landscape pictures, so it was important to make sure that different landscape pictures effectively elicited different responses. For this purpose, 13 variables were compared across the 30 pictures (see Table 4.2). ANOVA test shows that these 30 landscape pictures elicited significantly different responses for all of the 13 variables. In order to further confirm that the different responses were not caused by only a few pictures, a post hoc test conducted via a REGWQ procedure was conducted to make sure of the differences between the pictures. The REGWQ procedure was used because it has a tight control over a type I error, and has been suggested to be the best procedure for testing all pairs of means (Field, 2000). The post hoc tests indicated that the landscape pictures elicited at lease 8 levels of response. For complexity and mystery, these pictures elicited more than 15 levels of response. The measures of landscape visual preference and landscape aesthetic elicited more levels than emotional place bonding measures. The differences indicate that the picture selection method used was effective in eliciting variance from the sample.

Table 4.2
Variable Summary for Landscape Pictures

No.	#	*Mean Value*												
		LVP1	*LVP2*	*COM*	*MY*	*COH*	*LE*	*TYP*	*PI1*	*PI2*	*PI3*	*PD1*	*PD2*	*PD3*
101	83	2.2	3.0	2.4	2.1	3.6	3.5	2.1	2.1	2.1	2.0	2.0	1.9	1.9
102	67	4.4	4.9	4.4	4.5	4.6	5.1	4.4	3.6	3.6	3.8	3.6	3.5	3.4
103	55	5.7	5.9	5.4	5.8	5.5	5.6	5.7	4.5	4.5	4.5	4.4	4.7	4.3
104	85	5.1	5.5	5.0	5.1	4.9	5.2	5.3	4.2	4.2	4.2	4.1	4.0	3.8
105	75	4.2	4.7	4.5	4.9	4.1	4.3	4.2	4.0	3.9	3.9	3.9	3.5	3.7
106	76	3.8	4.5	3.4	3.4	4.4	4.4	4.0	2.9	3.1	2.9	2.8	2.9	2.8
107	82	5.2	5.6	5.1	5.0	4.9	5.3	5.4	4.3	4.4	4.3	4.3	4.3	4.1
108	72	3.9	4.6	3.7	3.8	4.2	4.2	4.1	3.2	3.2	3.1	3.1	3.0	2.9
109	72	3.4	4.1	3.8	3.8	4.1	4.2	3.1	2.8	2.8	2.7	2.7	2.6	2.5
110	66	3.5	4.3	3.4	3.3	4.2	4.4	4.1	3.0	3.1	2.9	3.0	2.8	2.8
111	60	4.6	5.3	4.7	4.3	4.9	5.1	4.9	3.7	3.8	3.8	3.5	3.5	3.5
112	71	4.3	4.9	4.0	3.7	4.7	4.9	4.5	3.7	3.7	3.7	3.5	3.5	3.4
113	66	4.4	4.9	4.2	5.3	4.6	4.7	4.1	3.9	3.8	3.7	3.8	3.6	3.5
114	61	4.2	4.6	4.3	4.9	4.5	4.5	4.1	3.6	3.7	3.7	3.7	3.5	3.6
115	83	5.1	5.4	5.0	5.4	5.0	5.3	5.4	4.2	4.3	4.1	4.1	4.2	3.9
201	83	4.0	4.5	4.1	4.8	3.7	3.9	3.7	3.1	3.1	3.1	3.1	3.1	2.9
202	64	5.3	5.8	5.8	5.4	4.9	5.1	3.8	3.9	3.9	4.0	4.0	4.0	4.0
203	67	5.2	5.5	5.2	5.7	4.6	4.8	4.7	4.3	4.3	4.3	4.4	4.3	4.0
204	79	5.3	5.7	4.9	4.8	5.1	5.3	4.8	4.7	4.8	4.6	4.9	4.6	4.7
205	81	3.1	3.7	3.0	3.0	4.0	3.8	2.8	2.6	2.5	2.6	2.6	2.3	2.5
206	82	4.9	5.2	4.4	4.5	4.9	5.1	4.8	4.0	3.8	3.8	3.8	3.7	3.6
207	78	5.5	5.8	5.5	5.6	5.2	5.3	5.1	4.7	4.6	4.6	4.7	4.5	4.5
208	75	5.2	5.5	5.3	5.8	4.5	5.0	4.9	4.3	4.4	4.3	4.4	4.3	4.1
209	61	2.3	3.1	3.1	3.1	3.0	3.5	1.9	2.0	2.0	2.0	2.1	1.9	1.9
210	66	4.0	4.6	4.0	3.9	4.2	4.2	3.2	3.0	3.0	3.0	3.2	2.8	2.8
211	56	5.0	5.5	4.9	5.3	4.5	4.8	4.5	4.3	4.2	4.3	4.2	4.3	4.0
212	68	4.8	5.3	4.8	5.4	4.8	4.9	4.5	4.0	4.0	4.1	4.1	4.0	3.9
213	65	4.9	4.9	4.6	4.6	4.8	4.9	3.9	4.0	4.1	4.1	4.2	4.1	4.0
214	58	4.5	4.9	4.1	4.7	4.7	4.6	4.2	3.4	3.4	3.5	3.5	3.3	3.1
215	86	3.4	4.0	3.6	3.4	3.6	3.8	3.0	2.6	2.6	2.7	2.9	2.9	2.8
Max	86	5.7	5.9	5.8	5.8	5.5	5.6	5.7	4.7	4.8	4.6	4.9	4.7	4.7
Min	55	2.2	3.0	2.4	2.1	3.0	3.5	1.9	2.0	2.0	2.0	2.0	1.9	1.9
P	n/s[a]	*** [b]	***	***	***	***	***	***	***	***	***	***	***	***
SUB[C]	n/a	14	11	16	15	11	8	12	8	9	8	11	8	8

NOTE: a: p-value of chi-square test; n/s: non-significant
b: p-value of ANOVA F-test; ***: p<0.001
c: Numbers of Homogeneous Subsets using REGWQ method

NORMALITY TEST

Normal distribution is the basic assumption for many parametric statistic analyses. The most widely used estimation method in structure estimation modeling assumes a multivariate normality, which means the joint distribution of any pair of variables is bivariately normal, and all bivariate scatterplots are linear and homoscedastic (Kline, 2005). Since it is impractical to examine all joint frequency distributions, univariate normality was examined instead of multivariate normality. Kline (2005) suggests that multivariate non-normality is usually detectable through examining univariate distributions.

Skew and kurtosis are two ways to examine univariate normality. The skew and kurtosis indexes of all 13 variables are reported in Table 4.3. The ratio of skew and kurtosis to their standard errors are often used as a test for normality (Kline, 2005; SPSS Inc., 1999). The absolute value of the ratio greater than 2 indicates a population skew or kurtosis problem. However, such tests may not be useful for large samples since they are too sensitive, and interpreting the absolute values of skew or kurtosis indexes may be an alternative (Kline, 2005). Kline (2005) suggests that absolute values of skew indices greater than 3.0, and kurtosis indices greater than 8.0 may indicate problems of normality. The absolute skew indexes of the variables range from 0.1 to 0.79, and the kurtosis indexes range from 0.15 to 1.04 (see Table 4.3). According to these criteria, data collected were accepted as normally distributed, and appropriate for further analysis.

Table 4.3
Skew Index and Kurtosis Index of Variables

Variable	*Skewness*		*Kurtosis*	
	Statistic	*SE*	*Statistic*	*SE*
LVP1	-0.33	0.05	-0.72	0.11
LVP2	-0.79	0.05	-0.15	0.11
COM	-0.17	0.05	-0.86	0.11
MY	-0.29	0.05	-0.94	0.11
COH	-0.32	0.05	-0.52	0.11
LE	-0.44	0.05	-0.47	0.11
TYP	-0.19	0.05	-0.99	0.11
PI1	0.10	0.05	-1.00	0.11
PI2	0.11	0.05	-1.00	0.11
PI3	0.10	0.05	-1.02	0.11
PD1	0.12	0.05	-1.02	0.11
PD2	0.21	0.05	-1.04	0.11
PD3	0.26	0.05	-0.99	0.11

DIFFERENCE BETWEEN PERSONAL CHARACTERISTICS

Differences between personal characteristics were examined using ANOVA after the data screening. Since age and color blindness were homogeneous (see Table 4.4), only gender and professional training were further examined. As shown in the table, there is no significant gender difference in the measures of landscape visual preference and landscape aesthetic. However, similar to the results of Kyle et al. (2004), males had a significantly higher emotional bond with landscapes than did females. All six EPB items were significantly different based on gender. The respondents who indicated having received aesthetics-related training had a significantly lower rating on 2 items, LVP2 and PI3. The perceived typicality to national park was significantly different between trained and un-trained respondents. These trained participants seem to have

more precise images about national parks because they expressed a significantly higher level of typicality to the landscape scenes that were taken from national parks.

Table 4.4
ANOVA Results of Personal Characteristics Difference

	Gender				*Training*			
	Male	*Female*	*p*	*eta²*	*Yes*	*No*	*p*	*eta²*
LVP1	4.36	4.36	0.832	<0.001	4.26	4.41	0.089	0.001
LVP2	4.91	4.79	0.084	0.001	**4.74**	**4.90**	**0.026**	**0.002**
Complexity	4.35	4.32	0.749	<0.001	4.23	4.38	0.072	0.002
Mystery	4.51	4.45	0.403	<0.001	4.44	4.50	0.472	<0.001
Coherence	4.49	4.48	0.811	<0.001	4.40	4.51	0.134	0.001
Legibility	4.67	4.59	0.265	0.001	4.66	4.64	0.764	<0.001
Typicality	4.22	4.10	0.120	0.001	**4.31**	**4.13**	**0.048**	**0.002**
PI-1	**3.79**	**3.32**	**<0.001**	**0.017**	3.52	3.64	0.155	0.001
PI-2	**3.80**	**3.32**	**<0.001**	**0.017**	3.52	3.65	0.130	0.001
PI-3	**3.77**	**3.33**	**<0.001**	**0.015**	**3.45**	**3.66**	**0.018**	**0.003**
PD-1	**3.76**	**3.35**	**<0.001**	**0.012**	3.53	3.63	0.253	0.001
PD-2	**3.67**	**3.22**	**<0.001**	**0.015**	3.50	3.50	0.989	<0.001
PD-3	**3.57**	**3.17**	**<0.001**	**0.012**	3.38	3.43	0.607	<0.001
Cases	1326	816			533	1609		

Two further tests were conducted to determine if the landscape pictures were equally assigned across different genders and levels of training. If the pictures were not equally assigned, the effects of gender and aesthetic training would be confounded with the differences between pictures. The chi-square test shows that different landscape pictures were equally assigned (chi-square=5.60, 5.33; df=29; p=1.00; see Table 4.5). There is no significant association between the pictures and these two personal characteristics. Any issue of a confounding effect can be eliminated, and the effects of gender and training confirmed.

Table 4.5
Distribution of Pictures Across Personal Characteristics

Pic#	Gender				Training				Total
	Male		Female		Yes		No		
101	53	64.6%	29	35.4%	20	24.4%	62	75.6%	82
102	41	61.2%	26	38.8%	13	19.4%	54	80.6%	67
103	33	60.0%	22	40.0%	18	32.7%	37	67.3%	55
104	53	62.4%	32	37.6%	21	24.7%	64	75.3%	85
105	47	62.7%	28	37.3%	18	24.0%	57	76.0%	75
106	47	61.8%	29	38.2%	19	25.0%	57	75.0%	76
107	51	62.2%	31	37.8%	21	25.6%	61	74.4%	82
108	42	58.3%	30	41.7%	17	23.6%	55	76.4%	72
109	46	63.9%	26	36.1%	18	25.0%	54	75.0%	72
110	38	57.6%	28	42.4%	15	22.7%	51	77.3%	66
111	40	66.7%	20	33.3%	16	26.7%	44	73.3%	60
112	42	59.2%	29	40.8%	17	23.9%	54	76.1%	71
113	41	62.1%	25	37.9%	17	25.8%	49	74.2%	66
114	39	63.9%	22	36.1%	17	27.9%	44	72.1%	61
115	53	63.9%	30	36.1%	22	26.5%	61	73.5%	83
201	53	63.9%	30	36.1%	21	25.3%	62	74.7%	83
202	40	62.5%	24	37.5%	15	23.4%	49	76.6%	64
203	40	59.7%	27	40.3%	16	23.9%	51	76.1%	67
204	49	62.0%	30	38.0%	20	25.3%	59	74.7%	79
205	51	63.0%	30	37.0%	20	24.7%	61	75.3%	81
206	53	64.6%	29	35.4%	22	26.8%	60	73.2%	82
207	49	62.8%	29	37.2%	19	24.4%	59	75.6%	78
208	45	60.0%	30	40.0%	17	22.7%	58	77.3%	75
209	38	62.3%	23	37.7%	15	24.6%	46	75.4%	61
210	39	59.1%	27	40.9%	15	22.7%	51	77.3%	66
211	36	64.3%	20	35.7%	16	28.6%	40	71.4%	56
212	39	57.4%	29	42.6%	15	22.1%	53	77.9%	68
213	43	66.2%	22	33.8%	18	27.7%	47	72.3%	65
214	33	56.9%	25	43.1%	13	22.4%	45	77.6%	58
215	52	60.5%	34	39.5%	22	25.6%	64	74.4%	86
Total	1326	61.9%	816	38.1%	533	24.9%	1609	75.1%	2142
	Chi-Square=5.33; df=29; p=1.00				Chi-Square=5.60; df=29; p=1.00				

Although some significant differences were found between personal characteristics, some of these differences are not meaningful when considering the effect

size. Effect size is examined with Eta squared, which is interpreted as the proportion of the variability of the dependant variable that is explained by knowing the values of the independent variable (SPSS Inc., 1999). Cohen (1988) suggests that the critical ratios of eta-squared for small, medium, and large effect sizes are 0.0099, 0.0588, 0.1379, respectively. Gender accounted for about 1.5% of the variance of EPB, which has only a small effect size, and professional training accounted for less than 0.5% of the variance of the variables. In other words, these differences are substantive but trivial. These differences may not be very useful in real world, although they significantly exist.

RELIABILITY TEST

The items used for this study are under three constructs: landscape aesthetic, emotional place bonding, and landscape visual preference. Cronbach's alpha was used to test the reliability of these constructs. The alpha of these three constructs ranges from 0.84 to 0.98, indicating a good level of reliability (see Table 4.6). Deleting any item in the scales would reduce their alpha. In other words, the items in each scale measured the same latent concept.

The items for emotional place bonding were adapted from the place attachment scale with two dimensions: place identity and place dependence. However, the data shows that these six items have high scale reliability. An exploratory factor analysis was conducted to further examine their potential dimensionality of EPB (see Table 4.7). The result shows that the six items strongly load on a single factor, which explained 88.77% of variance. Therefore, the six items will be treated as uni-dimensional in this study. Similar approach can be found in the study of Moore and Scott (2003), which also used

a uni-dimensional measure rather than comprised of place identity and dependence dimensions.

Table 4.6
Scale Reliability for Landscape Aesthetic, Emotional Place Bonding, and Landscape Visual Preference

Construct	*Alpha*	*Item*	*Alpha if deleted*
LA	0.84	COM	0.79
		MY	0.80
		COH	0.81
		LE	0.80
EPB	0.98	PI1	0.970
		PI2	0.969
		PI3	0.968
		PD1	0.970
		PD2	0.971
		PD3	0.971
LVP	0.86	LVP1	--
		LVP2	--

Table 4.7
Results of Factor Analysis for EPB Items

Variable	Factor Loading	Communalities
PI1	0.952	0.889
PI2	0.952	0.906
PI3	0.943	0.907
PD1	0.938	0.881
PD2	0.934	0.871
PD3	0.933	0.872
Eigenvalues	5.33	
Variance Explained	88.77%	

NOTE: Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
KMO: 0.91; Bartlett's Test: 19883.4 (df=15; p<0.001)

CHAPTER V
RESULTS

The intent of this chapter is to report the procedures and results related to testing the hypothesized relationships in the models and research questions proposed (see Figure 5.1 and Figure 5.2). First, the hypothesized relationship between emotional place bonding and the landscape aesthetic was tested with a multiple regression model. Second the complete conceptual model, which includes both connotative meaning (emotional place bonding) and denotative meaning (typicality) components of a symbolic aesthetic as a mediator between landscape aesthetic and visual preference, was examined. Finally, the four hypothesized mediators were further tested using Baron and Kenny's (1986) procedure.

RELATIONSHIP BETWEEN LANDSCAPE AESTHETICS AND EMOTIONAL PLACE BONDING

The first hypothesis states that significant variation in emotional place bonding will be explained by perception of landscape aesthetic components. That is, EPB would be predicted by perceptions related to complexity, mystery, coherence, and legibility in scenes viewed. The hypothesized model is displayed in Figure 5.1. In order to simplify the relationship, an index for EPB was computed using the average of the six EPB items. These six items are appropriate for use as a single scale, since they have a high reliability (see Table 4.6).

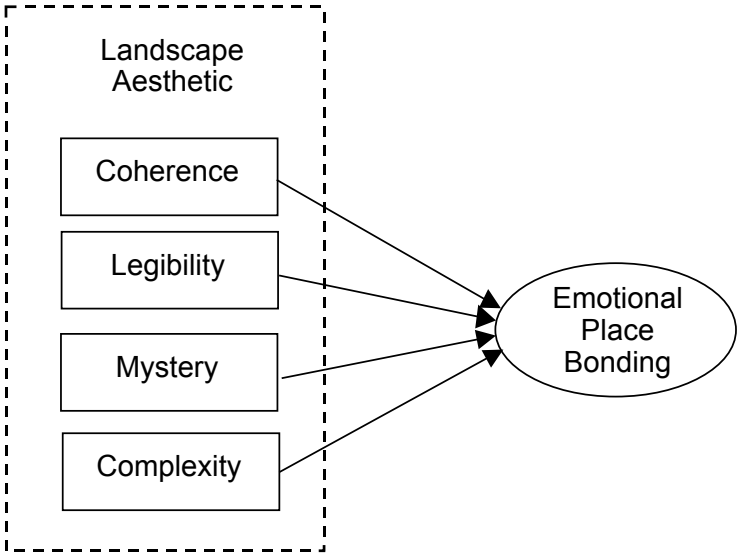

Figure 5.1 Theoretical Model for the Relationship Between Emotional Place Bonding and Landscape Aesthetics Components

The multiple regression results are reported in Table 5.1. Although the four landscape aesthetic components have high scale reliability, there is no serious multicollinearity in the regression model. Field (2000) indicated that a regression model would have serious multicollinearity problems when the VIF is larger than 10, or tolerance is below 0.2. As display in Table 5.1, the values of tolerance range from 0.36 to 0.40, and VIF range from 2.5 from 2.79, so the model was not biased with any serious level of multicollinearity.

The four variables representing landscape aesthetic explained 45% of the variance in EPB (adj. R^2=0.45). Results indicated that there were positive relationships between the level of emotional bonding and each landscape aesthetic component. All of the components were significant predictors of EPB. Mystery and complexity were the more influential variables among the landscape aesthetic components (β=0.265), (β

=0.260) respectively, while legibility (β =0.141), and coherence (β =0.139) had less explanatory power. This result indicated that perceptions of a landscape's basic aesthetic features explain a portion of the emotional bond formed with the landscape. Hypothesis 1 stated that a significant amount of the variation in emotional place bonding would be explained by landscape aesthetic components. This portion of the results supports this hypothesis by showing a significant and positive relationship between the level of emotional place bonding and the landscape aesthetics components of complexity, mystery, coherence, and legibility.

Table 5.1
Multiple Regression Analysis of Four Landscape Aesthetic Measures on Emotional Place Bonding

	B	*Std. Error*	*Beta*	*t-value*	*Tolerance*	*VIF*
(Constant)	-0.10	0.10		-1.002 (ns)		
COM	0.26	0.03	0.26	10.14***	0.39	2.56
MY	0.25	0.02	0.27	10.47***	0.40	2.50
COH	0.15	0.03	0.14	5.28***	0.37	2.70
LE	0.15	0.03	0.14	5.28***	0.36	2.79

NOTE: Dependent Variable: Emotional Place Bonding
COM-complexity; MY: mystery; COH: coherence; LE: legibility
Adjusted R^2: 0.45
***: p<0.001

INTEGRATED MODEL OF LANDSCAPE VISUAL PREFERENCE

This second section relates information about testing the hypothesized model for landscape visual preference, when integrated with emotional place bonding and typicality following the framework of Nasar's symbolic model (see Figure 5.2).

TESTING INTEGRATED MODEL

The integrated model was tested using a structural equation modeling technique. The theoretical model is displayed in Figure 5.2. In order to examine the theoretical model, a measurement model was assessed, and then the structural model examined. The measurement model was used to assess the relationship between latent variables and their observed measures, and the structural model focused on the links among the latent variables of interest (Byrne, 2001).

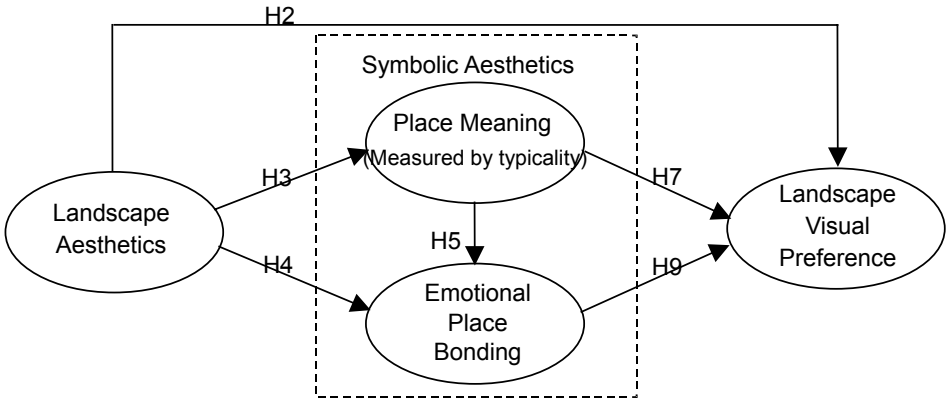

Figure 5.2 Theoretical Model for the Integrated Model

Preparing the Measurement Model

The measurement model was examined using confirmatory factor analysis, a method in which all factors are assumed to covary with each other (Kline, 2005). The measurement model is used to evaluate if the instruments are appropriately measuring the underlying constructs that they are designed to measure (Byrne, 2001). The measurement model should be tested before testing the full model to assess the

appropriateness of the measures used. Since typicality is an observed variable that is measured with one item, and one item measurement is suggested not to be analyzed in the measurement model (Rundle-Thiele, 2005), only three constructs that measured with multiple items (i.e., landscape aesthetic, emotional place bonding, and landscape visual preference) were included in the measurement model. The validity of the three constructs was also examined using the measurement model.

The measurement model is displayed in Figure 5.3. The results showed that the measurement model was a misfit. The Chi-square = 3275.512 (df=51), $p<0.001$, CFI=0.894, GFI=0.783, RMSEA=0.172. Indices were not in the acceptable range. The data screening statistics, the squared multiple correlation (SMC), indicated multicollinearity between the variables PI1, PI2, and PI3 (see Table 5.2). SMC is the variance shared between each variable and the other variables within a construct, and the value larger than 0.9 suggests multicollinearity (Kline, 2005, p. 57). Two basic ways to handle multicollinearity are to either delete variables, or to combine redundant ones into a composite variable (Kline, 2005). The multicollinear variables all represent the concept "place identity" and were adapted from the Williams and Vaske (2003) place attachment scale so they were combined into one place identity index. The place identity index was computed as the mean of the three items (PI1, PI2, PI3).

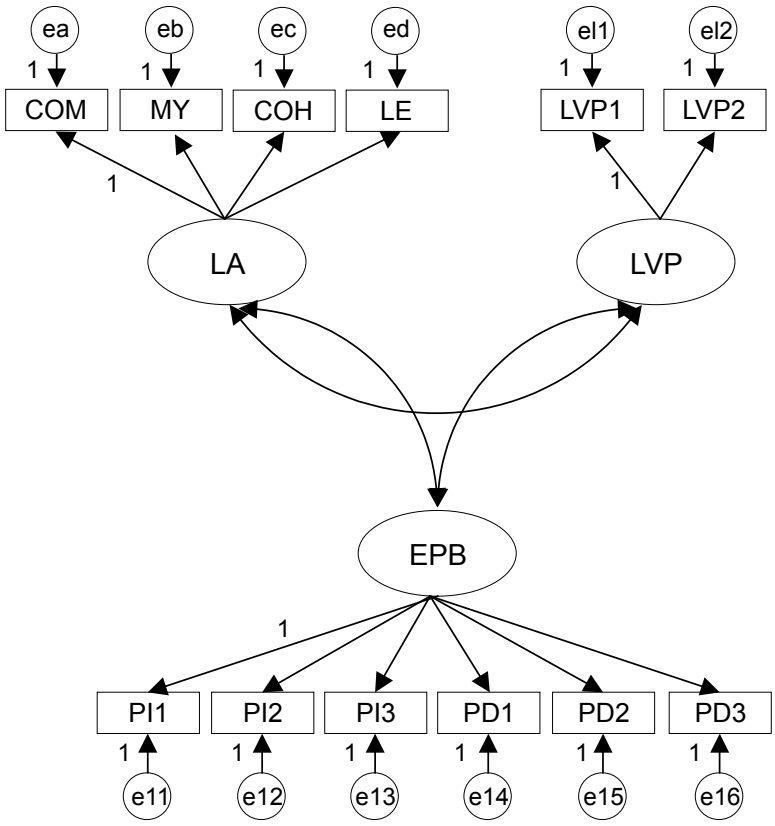

Figure 5.3 Measurement Model for the Hypothesized Integrated Model

Next, the Modification Indexes (MIs) were examined to identify the areas of misfit in the model (see Table 5.3). Since the un-estimated parameters (paths) were fixed at zero, MI can be conceptualized as a chi-square statistic with one degree of freedom when a parameter is released (Byrne, 2001). MIs are often used to improve model fit (Hoyle, 1995). A larger MI indicates a larger improvement in the model fit when the parameters can be freely estimated in the model. The model modification procedure of using MIs is sensitive to sample size (MacCallum, 1995). MacCallum (1995) indicates that modification is highly unstable from sample to sample when the sample size is

smaller than 400, and is not completely stable with a sample size of 1200. With a sample size of 2142 in this study, MIs should provide valuable information for a stable model modification.

Table 5.2
Squared Multiple Correlations for the Measurement Model

Variable	*Estimate*
LVP1	0.85
LVP2	0.66
COM	0.74
MY	0.69
COH	0.40
LE	0.42
PI1	**0.90**
PI2	**0.92**
PI3	**0.91**
PD1	0.82
PD2	0.80
PD3	0.80

As shown in Table 5.3, the model fit could be substantially improved by permitting errors to be correlated between COH (coherence, or "How easy is it to structure and organize the scene?") and LE (legibility, or "How easily can you tell what is being depicted in the scene?"). The correlation of errors are not an uncommon procedure for a covariance structural analysis of psychological data (Byrne & Shavelson, 1996), and the structural parameter estimates will not change with such covariance (Byrne & Shavelson, 1987). The correlated errors suggest that measurement errors in the item responses are systematic rather than random (Byrne, 1994). These systematic errors may come form redundant item contents (Byrne, 1994) or be introduced by a particular

measurement method (Byrne & Shavelson, 1986). Jöreskog (1998) argues that "every correlation between error terms must be justified and interpreted substantively" (p. 113). To make such specifications, they must be supported by strong rationales: first, these two items are conceptually similar such that both measure participants' understanding of landscapes. Second, these two items have similar wording that make them look like redundant items. Besides, Li (1996) argued that the wording of legibility may be ambiguous for natural environments because the concept is derived from an urban environment where landmarks are easy to find (p. 128). Moreover, these two items were adjacent to each other in the questionnaire, which made them easy to use for eliciting additional effects (Dillman, 2000, p.90). Babbie (2001) also points out that matrix questions are easy for fostering a response-set among some respondents (p. 248). A similar case of correlated errors can be found in the study of Kyle et al. (2005). Based on this rationale, the model was subsequently specified with the measurement error to be correlated.

Table 5.3
Portion of the Modification Index Output for the Measurement Model

			MI	*Par. Change*
e16	<-->	LA	14.9	-0.05
e16	<-->	LVP	5.0	-0.03
e16	<-->	EPB	25.8	0.08
e11	<-->	LA	37.3	0.09
e11	<-->	LVP	39.0	0.09
e11	<-->	EPB	112.2	-0.19
e11	<-->	e16	59.9	-0.08
e11	<-->	e14	19.2	0.05
ed	<-->	LVP	4.3	-0.05
ed	<-->	EPB	12.7	0.11
ed	<-->	e16	5.0	-0.04
ed	<-->	e11	5.7	0.05
ec	<-->	EPB	14.2	0.11
ec	<-->	e14	6.8	0.05
ec	<-->	ed	1002.8	1.03
eb	<-->	ed	71.0	-0.25
eb	<-->	ec	67.6	-0.24
ea	<-->	LVP	14.9	0.07
ea	<-->	EPB	21.3	-0.11
ea	<-->	e16	6.2	-0.04
ea	<-->	e11	17.5	0.07
ea	<-->	ed	89.4	-0.25
ea	<-->	ec	115.4	-0.28
ea	<-->	eb	110.9	0.24
el2	<-->	LA	15.5	-0.07
el2	<-->	EPB	28.4	0.12
el2	<-->	e11	5.8	0.04
el2	<-->	ea	8.6	-0.06
el1	<-->	LA	7.0	0.04
el1	<-->	EPB	13.9	-0.07
el1	<-->	e16	4.5	-0.03
el1	<-->	e14	8.5	-0.04
el1	<-->	e11	19.0	0.06
el1	<-->	ed	5.2	-0.05
el1	<-->	ea	35.2	0.11

			MI	*Par. Change*
LE	<---	EPB	4.6	0.04
LE	<---	PD1	4.8	0.03
LE	<---	PI	7.8	0.04
LE	<---	COH	571.9	0.42
LE	<---	MY	17.8	-0.06
LE	<---	COM	17.3	-0.07
LE	<---	PD2	6.2	0.04
COH	<---	EPB	5.3	0.04
COH	<---	PD3	4.0	0.03
COH	<---	PD1	8.5	0.04
COH	<---	PI	7.5	0.04
COH	<---	LE	543.4	0.40
COH	<---	MY	16.9	-0.06
COH	<---	COM	22.3	-0.08
MY	<---	LE	39.1	-0.10
MY	<---	COH	39.1	-0.10
MY	<---	COM	23.0	0.07
LVP2	<---	EPB	10.1	0.04
LVP2	<---	PD3	8.6	0.03
LVP2	<---	PD1	11.7	0.04
LVP2	<---	PI	14.0	0.05
LVP2	<---	COM	4.6	-0.03
LVP2	<---	PD2	8.0	0.03
LVP1	<---	EPB	5.3	-0.03
LVP1	<---	PD3	7.4	-0.03
LVP1	<---	PD1	9.1	-0.03
LVP1	<---	COM	10.7	0.04
LVP1	<---	PD2	5.9	-0.03
PD2	<---	LA	6.3	-0.03
PD2	<---	LVP	4.8	-0.02
PD2	<---	PD3	5.1	0.02
PD2	<---	COH	6.7	-0.03
PD2	<---	MY	4.9	-0.02
PD2	<---	COM	8.3	-0.03
PD2	<---	LVP1	4.9	-0.02

A modified model is shown in Figure 5.4 with two modifications: a composite indicator for place identity, and a correlation between the item of coherence and legibility. The modifications resulted in a good fit of the measurement model, Chi-square = 532.611, $p<0.001$, CFI=0.976, GFI=0.952, RMSEA=0.087. Standardized factor loadings and other related information are presented in Table 5.4. The next step is to examine the validity and reliability of the scales.

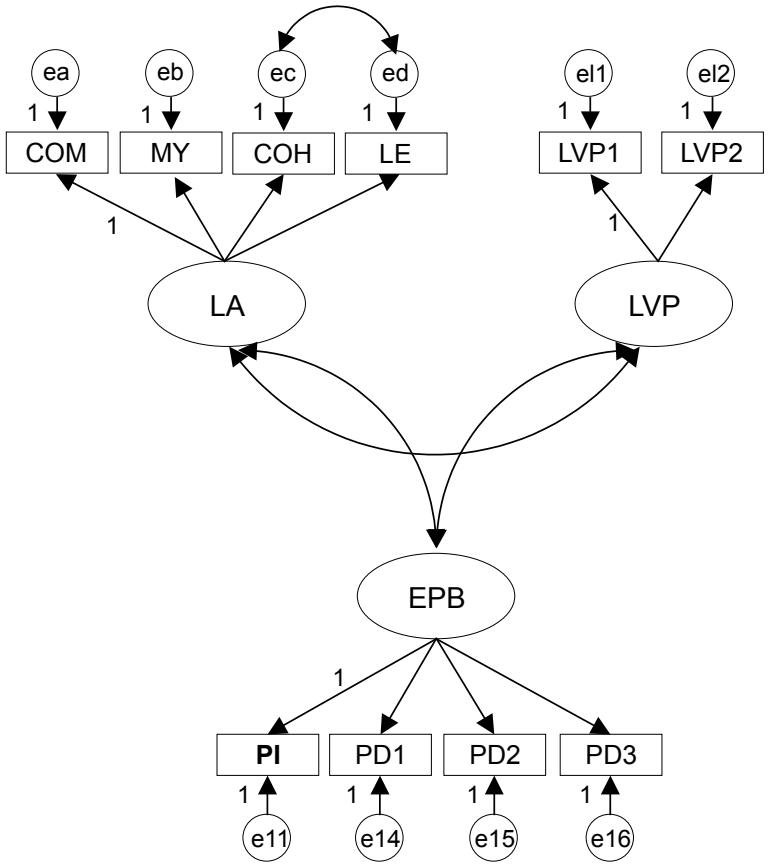

Figure 5.4 Modified Measurement Model

Table 5.4
Factor Loadings and Related Information for the Measurement Model

	Std. Factor Loading	*Standard Error*	*Critical Ratio (t value)*	*Squared Multiple Correlation*
Landscape Visual Preference				
LVP1	.924	-	-	0.86
LVP2	.813	.016	49.63***	0.66
Landscape Aesthetic				
COM	.885	-	-	0.78
MY	.847	.020	50.64***	0.72
COH	.564	.021	27.26***	0.32
LE	.588	.022	28.82***	0.35
Emotional Place Bonding				
PI	.916	-	-	0.84
PD1	.938	.013	78.62***	0.88
PD2	.940	.014	78.59***	0.88
PD3	.947	.013	80.30***	0.89

Convergent Validity

It is a fundamental principle in science that any construct should be measured with more than one test to prevent artifact measurement (Churchill, 1979) so it is important to know if the tests really measure the same construct. Convergent validity is "the degree to which two measures designed to measure the same construct are related" (Netemeyer, Bearden, & Sharma, 2003, p. 142). The traditional way to examine convergent validity is to test the scale of interest with another scale that measures a similar construct (Churchill, 1979; Jones et al., 2000). In SEM analysis, Hatcher (1994) suggests that convergent validity can be accessed by the t-test of factor loadings. Anderson and Gerbing (1988) also suggest that convergent validity can be demonstrated if all factor loadings are statistically significant. As displayed in Table 5.4, all of the factor loadings are significantly different from zero at 0.001 levels. The significant

loadings indicated that all items measured the constructs that they were designed to measure. Hatcher (1994) also suggests that convergent validity can be supported if all factor loadings for the indicators are greater than twice their standard errors. All of the items also meet the criteria. There appears to be good convergent validity across measures.

Discriminant Validity Test

In contrast to convergent validity, discriminant validity demonstrates that the test does not measure a construct that it was not designed to measure. Netemeyer et al. (2003) defined discriminant validity as a method that "assesses the degree to which two measures designed to measure similar, but conceptually different, constructs are related" (p. 142). A test with discriminant validity should not be highly correlated with constructs intended to measure different concepts (Churchill, 1979; Jones et al., 2000). Hatcher (1994) suggests the chi-square difference test for examining the discriminant validity of a scale. The test fixes the correlation between the two factors of interest as 1.0, which means that the two factors are perfectly correlated. Discriminant validity is supported if the chi-square value of the latter model (with perfect 1.0 correlation) is significantly higher than the original measurement model. The significant change in chi-squared value means that the model fits the data better when the two factors are viewed as distinct factors than when viewed as a same factor. Results showed that this requirement was satisfied when the chi-square values are significantly higher than the original measurement model when the correlation of any two factors was fixed as 1.0 (see Table 5.5). Therefore, the three constructs, landscape visual preference, landscape aesthetic,

and emotional place bonding appeared to be distinct factors based on a good level of discriminant validity across these variables

Table 5.5
Chi-Square Difference Test Between Measurement Model and Models with One Correlation Fixed as One

	Original Measurement Model	*Model A Fixed LA-LVP*	*Model B Fixed LA-EPB*	*Model C Fixed EPB-LVP*
χ^2	532.6	918.2	644.9	772.6
df	31	32	32	32
χ^2 difference		385.6***	112.3***	240.0***
df		1	1	1

NOTE: ***: p<0.001

Reliability

"Scale reliability is the proportion of variance attributable to the true score of the latent variable" (DeVellis, 2003). Cronbach's alpha of the three factors are all larger than 0.7, which demonstrates satisfactory reliability.

Indicator reliability is the proportion of variation in the items that is explained by the factor that it is designed to measure, which is calculated as the square of the standardized factor loadings (Hatcher, 1994). The indicator reliability is shown in Table 5.6 as the Squared Multiple Correlation.

Composite reliability is similar to coefficient alpha, which reflects the internal consistency of the indicators (Fornell & Larcker, 1981; Hatcher, 1994). Hatcher (1994) suggests that 0.7 is a preferable, minimally acceptable level of composite reliability (p.329). As displayed in Table 5.6, all three factors meet the minimal level of acceptable reliability.

The average variance extracted depicts the "amount of variance that is captured by an underlying factor in relation to the amount of variance due to measurement error" (Hatcher, 1994, p. 331). It is believed to be a more conservative test (Fornell & Larcker, 1981; Hatcher, 1994). Fornell and Larcker suggested that the acceptable level for AVE is 0.5, which means the variance due to measurement error is less than the variance explained by the construct. In the current case, the variances that are captured by all three constructs are more than their measurement errors. Therefore, according to Fornell and Larcker (1981), the scales used in this study have satisfactory reliability, and validity.

Table 5.6
Reliability Tests for the Measurement Model

Construct	*Composite Reliability*	*AVE*	*Alpha*	*Item*	*Alpha if deleted*	*Squared Multiple Correlation*
LVP	0.86	0.76	0.86	LVP1	--	0.86
				LVP2	--	0.66
LA	0.82	0.54	0.84	COM	0.79	0.78
				MY	0.80	0.72
				COH	0.81	0.32
				LE	0.80	0.35
EPB	0.97	0.87	0.97	PI	0.96	0.84
				PD1	0.95	0.88
				PD2	0.95	0.88
				PD3	0.95	0.89

Combining all aforementioned tests provided empirical support that the scales used in the hypothesized model were valid and reliable measures. Therefore, the hypothesized model will be examined in the next step.

Hypothesized Model Analysis

The final phase of the analysis is to estimate the measurement and structural models simultaneously (see Figure 5.5). With this analysis, the researcher should test specific hypotheses and examine how well the hypothesized model fits the data.

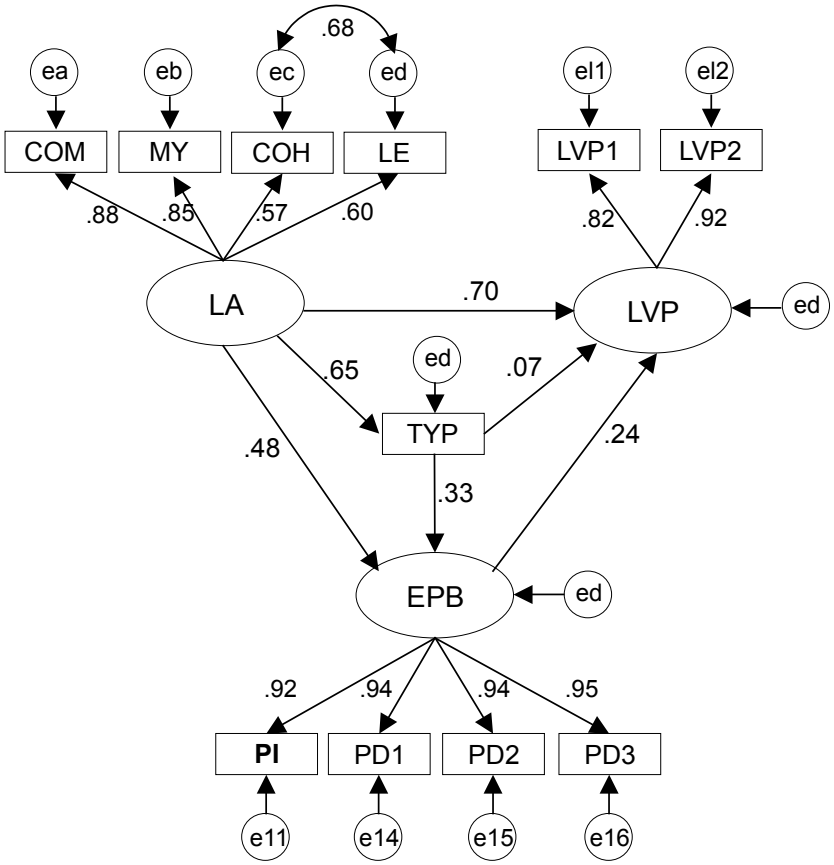

Figure 5.5 Structural Model and Standardized Coefficients of the Hypothesized Integrated Model

The hypothesized model demonstrated an acceptable fit; chi-square = 669.52, $p<0.001$, CFI=0.972, GFI=0.945, RMSEA=0.088 (see Table 5.7). All of the

relationships were significant at 0.001 levels, and no further model modification was considered to be appropriate. The hypothesized relationships were tested based on this model.

Table 5.7
Goodness-of-Fit Statistics of the SEM Models

	Chi-Square	*CFI*	*RMSEA*	*GFI*
Measurement Model	3275.51***	0.894	0.172	0.783
Modified Measurement Model	532.61***	0.976	0.087	0.952
Hypothesized Model	669.52***	0.972	0.088	0.945

NOTE: ***: $p<0.001$

Hypothesis 2 states that there will be a significant positive relationship between landscape visual preference and perceived landscape aesthetic. The results revealed that, as the literature suggested, the landscape aesthetic perceived by respondents was a positive predictor of their overall visual preference ($\beta=0.695$, $p<0.001$; see Table 5.8). That is, respondents preferred landscapes that they also scored higher on landscape aesthetic components that represent the biological basis of preference. Quantitatively, the standardized coefficient information implied that each unit of increase in landscape aesthetics would result in 0.695 units of increase for landscape visual preference. Thus, Hypothesis 2 is supported.

Hypothesis 3 states that Place meaning, as measured by the place's typicality to a national park, will be significantly and positively related to perceived landscape aesthetics. The results suggested that, as hypothesized, typicality (to a national park) was

positively influenced by the level of landscape aesthetics (β=0.648, p<0.001; see Table 5.8). In other words, respondents felt that the landscape was more like a national park when it had a higher level of landscape aesthetics. Quantitatively, for each unit of increase in landscape aesthetics, typicality increased 0.648 units. Thus, Hypothesis 3 is supported.

Table 5.8
Summary of SEM Analysis

Direct Effect	*Std. Path Coefficient*	*Standard Error*	*Critical Ratio*	*p-value*
TYP <--- LA	.648	.026	31.438	<0.001
EPB <--- TYP	.325	.020	14.425	<0.001
EPB <--- LA	.479	.027	18.996	<0.001
LVP <--- LA	.695	.027	26.422	<0.001
LVP <--- EPB	.242	.020	11.693	<0.001
LVP <--- TYP	.072	.016	3.809	<0.001

NOTE: ***: p<0.001

Hypothesis 4 stated that emotional place bonding will be significantly and positively related to perceived landscape aesthetic. Consistent with the results from hypothesis 1, which shows that emotional place bonding could be significantly explained by the components of landscape aesthetics, the result here demonstrates that emotional place bonding was positively influenced by landscape aesthetics as a latent variable (β=0.379, p<0.001; see Table 5.8). That is, a higher level of landscape aesthetic will induce a higher level of emotional bonding to the landscape. For each unit of increase in landscape aesthetic, emotional place bonding increased 0.479 units. Therefore, Hypothesis 4 is supported.

Hypothesis 5 states that Emotional place bonding will be significantly and positively related to perceived meaning of a place, as measured by the place's typicality to a national park. The results suggested that, as hypothesized, emotional place bonding was positively influenced by typicality (β=0.325, $p<0.001$; see Table 5.8). In other words, respondents have a higher emotional bond to the landscape when they feel the landscape looks like a national park. Quantitatively, according to the standardized coefficient, for each unit of increase in typicality, emotional place bonding increased 0.325 units. Thus, Hypothesis 5 is supported.

Hypothesis 7 states that landscape visual preference will be significantly and positively influenced by perceived place meaning, as measured by the place's typicality to a national park. Results revealed that the typicality of the place to a national park was a significant positive predictor of landscape visual preference (β=0.072, $p<0.001$; see Table 5.8). That is, respondents preferred a landscape when it looked like a national park. The standardized coefficient information implies that for each unit of increase in typicality (to a national park), respondents' landscape visual preference increases 0.072 units. Thus, Hypothesis 7 is supported.

Hypothesis 9 states that landscape visual preference will be significantly and positively influenced by emotional place bonding Consistent with this hypothesis, landscape visual preference was found to be positively influenced by emotional place bonding (β= 0.242, $p< 0.001$; see Table 5.8). That is, respondents' level of preference for a landscape increased when they had stronger bonds with that landscape. Quantitatively, for each unit of increase in the emotional place bonding, respondents' landscape visual preference increased 0.242 units. Thus, Hypothesis 9 is supported.

TESTING HYPOTHESIZED MEDIATION EFFECTS

Hypotheses 10 to Hypothesis 13 are all related to the mediation effects of typicality (to a national park) and emotional place bonding. Although the significant paths in the integrated model supported the existence of partial mediation, these hypothesized mediation effects were also examined using traditional regression procedures. The procedure was used to explore the influence of the mediators (i.e. the coefficient change for the independent variable).

Four hypothesized causality orderings were examined using a hierarchical regression analysis. The four hypothesized mediators are typicality, emotional place bonding in the relationship between landscape aesthetic and landscape visual preference, and the mediating role of emotional place bonding between typicality and landscape visual preference (see Figure 5.6).

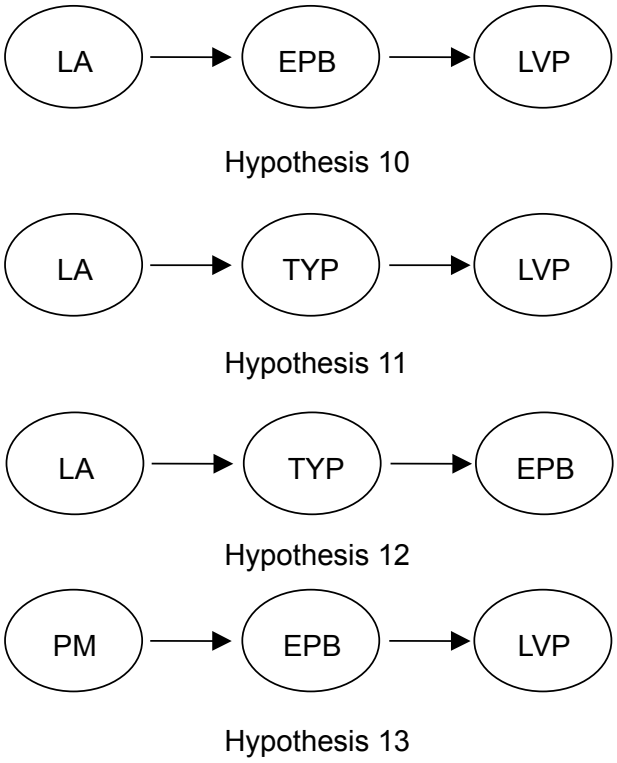

Figure 5.6 Illustration of Four Hypothesized Mediation Effects

The four hypothesized mediating effects were examined using Baron and Kenny's (1986) procedure. This procedure has been used widely in many studies in different areas like recreation (e.g. Baker & Crompton, 2000; Kyle, Absher, & Graefe, 2003; Vaske, Donnelly, Williams, & Jonker, 2001; Zinn & Manfredo, 2000), nature resource management (Dougherty, Fulton, & Anderson, 2003; Ellis, Lee, & Kweon, 2006), tourism (Tsaur & Lin, 2004), and landscape preference (Herzog & Kropscott, 2004; Herzog & Shier, 2000; Staats & Hartig, 2004; van den Berg, Koole, & van der Wulp, 2003). Baron and Kenny's (1986) procedure suggests that to examine if X's effect on Y is mediated by M, three regression models should be tested: (1) Y=f(X); (2)

M=f(X); and (3) Y=f(M, X). The role of M as a mediator is not established until: (a) all three models are significant, and (b) the effect of X on Y in model (3) is substantially less than its effect in model (1). If the effect of X becomes insignificant in model (3), it is a complete mediation. If this effect is notably reduced but X is still significant in model (3), then it is a partial mediation. Three composite indices were generated for LA, EPB, and LVP, using their item averages in order to simplify the relationship. Reliability tests indicated that the items in these three constructs measured the concept that they were designed to measure (see Table 4.6), so it is reasonable to compute these averages.

Hypothesis 10 states that the relationship between landscape aesthetic and landscape visual preference is mediated by emotional place bonding. Three regression models were analyzed and the results are displayed in Table 5.9. Referring to Table 5.9 for the Beta coefficient estimates of models 1, 2, and 3, it can be found that all of the mediating conditions set by Baron and Kenny (1986) were satisfied. Specifically, (a) landscape aesthetic had a positive effect on emotional place bonding (as in model 1), (b) landscape aesthetic had a positive effect on landscape visual preference (as in model 2), and (c) the effect of landscape aesthetic on landscape visual preference was substantially reduced from 0.77 to 0.50 by the introduction of emotional place bonding (as in model 3). The change in the F value also indicated that emotional place bonding significantly improved the model (from model 2 to model 3). Since both landscape aesthetics and emotional place bonding had a significant effect on landscape visual preference, it can be concluded that the relationship between landscape aesthetics and landscape visual preference is partially mediated by emotional place bonding. Therefore, Hypothesis 10 is supported.

Table 5.9
Summary of Regression Models for Testing Mediation Effects of EPB Between LA to LVP

Model	*DV*	*IV*	*B*	*S.E.*	*Beta*	*t*	*Adj. R^2*	*F Change*
1	EPB	Constant	-0.17	0.094		-1.82	0.44	
		LA	0.83	0.020	0.67	41.30***		
2	LVP	Constant	0.85	0.07		11.79***	0.58	3011.13***
		LA	0.84	0.02	0.77	54.87***		
3		Constant	0.91	0.06		14.25***		
		LA	0.55	0.02	0.50	30.10***	0.67	588.39***
		EPB	0.35	0.02	0.40	24.26***		

NOTE: Tolerance is 0.56; VIF 1.80 for Model 3
***: $p<0.001$

Hypothesis 11 states that the relationship between landscape aesthetic and landscape visual preference is mediated by place meaning, as measured by the place's typicality to a national park. A similar approach to above was used (see Table 5.10). Based on the standardized coefficient estimates of models 1, 2, and 3, it was found that the mediation effect of typicality between landscape aesthetics and landscape visual preference was supported. Specifically, (a) landscape aesthetics had a positive effect on typicality (as in model 1), (b) landscape aesthetics had a positive effect on landscape visual preferences (as in model 2), and (c) the effect of landscape aesthetics on landscape visual preferences was substantially reduced (from 0.77 to 0.60) when typicality entered the model (as in model 3). Both landscape aesthetics and typicality were significant in model 3 and the presence of typicality significantly improved the model (from model 2 to model 3). Therefore, it is concluded that the relationship between landscape aesthetics and landscape visual preference was also partially mediated by typicality. Hypothesis 11 is supported.

Table 5.10
Summery of Regression Models for Testing Mediation Effects of TYP Between LA to LVP

Model	*DV*	*IV*	*B*	*S.E.*	*Beta*	*t*	*Adj. R^2*	*F Change*
1	TYP	Constant	0.30	0.105		2.84**	0.40	
		LA	0.86	0.023	0.64	38.37***		
2	LVP	Constant	0.85	0.07		11.79***	0.58	3011.13***
		LA	0.84	0.02	0.77	54.87***		
3		Constant	0.78	0.07		11.44***		
		LA	0.66	0.02	0.60	34.93***	0.62	215.81***
		TYP	0.21	0.01	0.25	14.69***		

NOTE: Tolerance 0.59; VIF 1.69 for model 3
***: p<0.001

Hypothesis 12 states that the relationship between landscape aesthetic and emotional place bonding is mediated by place meaning, as measured by the place's typicality to a national park. The regression models used in this analysis are shown in Table 5.11. According to the standardized coefficient estimates of models 1, 2, and 3, it was found that the role of a mediator for emotional place bonding between typicality and landscape visual preference was supported. Specifically, (a) typicality had a positive effect on emotional place bonding (as in model 1), (b) typicality had a positive effect on landscape visual preference (as in model 2), and (c) when emotional place bonding entered the model, the effect of typicality on landscape visual preference was substantially reduced from 0.64 to 0.29 (as in model 3). The presence of emotional place bonding significantly improved model 3 as compared to model 2 (F-change =918, $p<0.001$.) Both emotional place bonding and typicality were significant in model 3, so it can be concluded that the relationship between typicality and landscape visual

preference was also partially mediated by emotional place bonding. Hypothesis 12 is supported.

Table 5.11
Summary of Regression Models for Testing Mediation Effects of EPB Between TYP to LVP

Model	*DV*	*IV*	*B*	*S.E.*	*Beta*	*t*	*Adj. R^2*	*F Change*
1	EPB	Constant	1.10	0.07		15.683***	0.41	
		TYP	0.59	0.02	0.64	38.472***		
2	LVP	Constant	2.45	0.06		39.82***	0.41	1471.2***
		TYP	0.52	0.01	0.64	38.36***		
3		Constant	1.92	0.05		35.35***		
		TYP	0.23	0.02	0.29	15.87***	0.59	918.2***
		EPB	0.48	0.02	0.55	30.30***		

NOTE: Tolerance 0.59; VIF 1.69 for model 3
***: p<0.001

Hypothesis 13 states that the relationship between place meaning, as measured by the place's typicality to a national park, and landscape visual preference is mediated by emotional place bonding. Similar to the procedures above, three regression models were analyzed and the results displayed in Table 5.12. Referring to Table 5.12 for the Beta coefficient estimates of models 1, 2, and 3, it was found that Baron and Kenny's (1986) criteria were all satisfied. Specifically, (a) landscape aesthetics had a positive effect on typicality (as in model 1), (b) landscape aesthetics had a positive effect on emotional place bonding (as in model 2), and (c) the effect of landscape aesthetics on emotional place bonding was substantially reduced from 0.67 to 0.44 with the presence of typicality (as in model 3). Further, the F-change indicated that the presence of typicality significantly improved the model from model 2 to model 3 (F-change=1163.2,

p<0.001). Both landscape aesthetics and typicality have significant effects on emotional place bonding; it was concluded that the relationship between landscape aesthetics and emotional place bonding was partially mediated by typicality. Therefore, Hypothesis 13 is supported.

Table 5.12
Summary of Regression Models for Testing Mediation Effects of TYP Between LA to EPB

Model	*DV*	*IV*	*B*	*S.E.*	*Beta*	*t*	*Adj. R^2*	*F Change*
1	TYP	Constant	0.300	0.105		2.843**	0.40	
		LA	0.863	0.023	0.638	38.367***		
2	EPB	Constant	-0.17	0.09		-1.823***	0.44	1705.4***
		LA	0.83	0.02	0.67	41.296***		
3		Constant	-0.27	0.09		-3.101***		
		LA	0.54	0.02	0.44	22.378***	0.52	1163.2***
		TYP	0.33	0.02	0.36	18.603***		

NOTE: Tolerance 0.59; VIF: 1.69 for model 3
***: p<0.001

EFFECT OF PLACE LABELS

In order to test the effect of denotative place meanings to LVP and EPB (Hypotheses 6 and 8), this study randomly labeled landscape pictures from the Kenting National Park with different place meanings, e.g., national park, commercial recreation area, local park, and scenic area.

A one-way ANOVA was conducted to examine if participants would respond to the landscape differently when the same landscape was labeled with different meanings. Results show that place labels did not have a significant influence on the way respondents perceived landscape scenes. (see Table 5.13). Another test indicated that the

four place labels were assigned to the 15 landscape pictures in an equitable manner. (Chi-Square=51.84; df=42; p=0.142; see Table 5.14).

Table 5.13
ANOVA Results of Place Label Differences

Variable	*Place Label*				*p-value*	*eta²*
	NP	*CRA*	*LP*	*SA*		
LVP1	4.41	4.62	4.46	4.49	0.42	0.003
LVP2	4.80	4.90	5.07	5.01	0.13	0.005
Complexity	4.50	4.45	4.32	4.60	0.34	0.003
Mystery	4.59	4.77	4.57	4.67	0.56	0.002
Coherence	4.40	4.50	4.47	4.37	0.76	0.001
Legibility	4.53	4.53	4.72	4.65	0.42	0.003
PI-1	3.49	3.75	3.72	3.81	0.09	0.006
PI-2	3.46	3.74	3.71	3.79	0.07	0.007
PI-3	3.51	3.84	3.64	3.74	0.11	0.006
PD-1	3.61	3.87	3.77	3.72	0.29	0.004
PD-2	3.42	3.75	3.67	3.61	0.12	0.006
PD-3	3.39	3.69	3.58	3.46	0.19	0.004
Number of Cases	408	253	216	192		

NP: National Park; CRA: Commercial Recreation Area; LP: Local Park; SA: Scenic area

Hypothesis 6 states that there will be significant differences among the emotional place bonding for landscape scenes labeled differently; and hypothesis 8 states that landscape visual preference will differ significantly among landscapes with different labels. Results showed that respondents did not have any significant differences responses to the landscape, in terms of EPB and LVP. Thus, hypotheses 6 and 8 were not supported.

Table 5.14
Distribution of Pictures Across Place Labels

No.	*Place Label*								*Total*
	NP		*CRA*		*LP*		*SA*		
201	34	41.0%	21	25.3%	15	18.1%	13	15.7%	83
202	32	50.0%	14	21.9%	6	9.4%	12	18.8%	64
203	24	35.8%	18	26.9%	18	26.9%	7	10.4%	67
204	34	43.0%	11	13.9%	18	22.8%	16	20.3%	79
205	34	42.0%	18	22.2%	18	22.2%	11	13.6%	81
206	34	41.5%	14	17.1%	18	22.0%	16	19.5%	82
207	33	42.3%	11	14.1%	18	23.1%	16	20.5%	78
208	25	33.3%	20	26.7%	18	24.0%	12	16.0%	75
209	22	36.1%	11	18.0%	15	24.6%	13	21.3%	61
210	20	30.3%	20	30.3%	16	24.2%	10	15.2%	66
211	14	25.0%	12	21.4%	16	28.6%	14	25.0%	56
212	25	36.8%	21	30.9%	6	8.8%	16	23.5%	68
213	24	36.9%	20	30.8%	11	16.9%	10	15.4%	65
214	22	37.9%	21	36.2%	5	8.6%	10	17.2%	58
215	31	36.0%	21	24.4%	18	20.9%	16	18.6%	86
Total	408	38.2%	253	23.7%	216	20.2%	192	18.0%	1069
Chi-Square=51.84; df=42; p=0.142									

NP: National Park; CRA: Commercial Recreation Area; LP: Local Park; SA: Scenic area

SUMMARY OF THE CHAPTER

The present chapter examined the hypothesized models and hypotheses outlined in Chapter III. Structural equation modeling analysis found an acceptable fit for the proposed model of the relationship between landscape visual preference and emotional place bonding. Regression analyses also supported the hypothesized relationships. All of the hypotheses were supported. In order to organize the results, a condensed summary of the study's major finding is shown in Table 5.15.

Table 5.15
Summary of Findings

	Relationship	*Results*
H1	Significant variation in emotional place bonding will be explained by perception of landscape aesthetic components	**Supported** Emotional place bonding was significantly and positively influenced by the four components of landscape aesthetics: complexity, mystery, coherence, and legibility. These four components can explain 45% of the variance in emotional place bonding.
H2	There will be a significant positive relationship between landscape visual preference and perceived landscape aesthetic	**Supported** Landscape visual preference was found to be significantly and positively influenced by landscape aesthetics
H3	Place meaning, as measured by the place's typicality to a national park, will be significantly and positively related to perceived landscape aesthetics.	**Supported** Landscape aesthetics was found to significantly and positively influenced place meaning, when place meaning was measured as the place's typicality to a national park.
H4	Emotional place bonding will be significantly and positively related to perceived landscape aesthetic.	**Supported** Landscape aesthetic was found to significantly influence emotional place bonding.
H5	Emotional place bonding will be significantly and positively related to perceived meaning of a place, as measured by the place's typicality to a national park.	**Supported** The typicality of the place to a national park was found to influence emotional place bonding significantly and positively.
H6	There will be significant differences among the emotional place bonding for landscape scenes labeled differently	**Not Supported** Respondents' level of emotional bonding to a place did not show any significant difference between different place labels.
H7	Landscape visual preference will be significantly and positively influenced by perceived place meaning, as measured by the place's typicality to a national park.	**Supported** Place meaning, as measured by the place's typicality to a national park, was found to significantly and positively influence landscape visual preference

Table 5.15 (continued)

	Relationship	*Results*
H8	Landscape visual preference will differ significantly among landscapes with different labels	**Not Supported** Respondents' level of landscape visual preference did not show any significant difference between different place labels.
H9	Landscape visual preference will be significantly and positively influenced by emotional place bonding	**Supported** Emotional place bonding was found to significantly influence landscape visual preference.
H10	The relationship between landscape aesthetic and landscape visual preference is mediated by emotional place bonding.	**Supported** The mediation effect was found to be a partial one, which landscape aesthetic still has direct effect on landscape visual preference.
H11	The relationship between landscape aesthetic and landscape visual preference is mediated by place meaning, as measured by the place's typicality to a national park.	**Supported** The mediation effect was found to be a partial one, which landscape aesthetic still has direct effect on landscape visual preference.
H12	The relationship between landscape aesthetic and emotional place bonding is mediated by place meaning, as measured by the place's typicality to a national park.	**Supported** The mediation effect was found to be a partial one, which landscape aesthetic still has direct effect on emotional place bonding.
H13	The relationship between place meaning, as measured by the place's typicality to a national park, and landscape visual preference is mediated by emotional place bonding.	**Supported** The mediation effect was a partial one, in that typicality still has direct effect on emotional place bonding.

CHAPTER VI
CONCLUSION

The chapter is divided into four sections. In the first section, the general findings have been summarized, including the relationships between landscape visual preference, emotional place bonding, and place meanings. The second section lays out the theoretical implications of this study. The third section conveys the managerial implications. The last section includes the limitations of this study and suggestions for future research.

FINDINGS AND DISCUSSIONS

The study provided an opportunity to combine the two major approaches to understanding the human-landscape relationship, the physical, or "biologically based," approach and the symbolic, or "cultural & personal meaning," approach, for the purpose of understanding true preferences for a particular kind of landscape. The physical approach was represented by landscape aesthetic research, which focused on how individuals evaluate their physical surroundings. The symbolic approach focuses on the symbolic/emotional association between occupants and environments. These two approaches view the human-landscape relationship from different perspectives and have seldom been integrated. This study focused on the methodological and analytical issues for combining landscape aesthetics and emotional place bonding in order to develop a more basic and comprehensive understanding of visual preferences for landscapes. The symbolic model proposed by Nasar (1989) was used to guide this study.

The symbolic model suggests that a true landscape visual preference consists of both formal landscape aesthetics and emotional/symbolic aesthetics. Formal attributes refer to the physical properties that create complexity, legibility, coherence and mystery; the symbolic attributes reflect an appreciation of the meanings or values of the environment. Both formal and symbolic attributes are the mediating variables of human environmental experience (Nasar, 1997). The symbolic model provides a perfect framework for combining the physical and symbolic perspectives of landscape research, but this conceptual model has not been well tested empirically.

Two basic objectives guided this study: 1) better understand the relationship between specific landscape characteristics and the emotional bonds people form with those landscapes, and 2) to understand if and how the relationships between formal landscape aesthetics and emotional bonding with a place predict visual preferences for a landscape. Two conceptual models were hypothesized and tested for these two objectives.

RELATIONSHIP BETWEEN LANDSCAPE AESTHETICS AND EMOTIONAL PLACE BONDING

The first model suggests that the emotional bonds people feel for a place will be predicted by what they perceive in the way of the physical landscape; a landscape aesthetic (see Figure 5.1). Support for the model was related in Chapter V. The results suggested that a person's affective link to a place was influenced by physical characteristics that comprise its visual appearance (landscape aesthetic). Because developing emotional bonds to a place normally requires long-term interaction with that

place, it is not likely that respondents in this study had a strong affective link with the landscapes of the unknown places they viewed. The model suggests that different visual appearances of landscapes (landscape aesthetics) would elicit different levels of emotional bonding to that landscape. Since respondents had no direct experience with the national parks in the study, they might recall the feelings they associated with other places and transfer those feelings to the landscapes they rated. For example, one of the respondents used the comment link at the end of the survey to send a comment to the author, asking if the landscape pictures were taken from the outskirts of the Grand Canyon, or from the Painted Dessert. In other words, this respondent might think of his/her existing feelings for the Grand Canyon, Painted Desert, or similar places, and therefore those feelings were transferred to the landscapes he/she was rating.

The results of the relationship between these two primary components of landscape/place preference are consistent with the views of Farnum et al. (2005) and Jones (2000) when they suggest that people may have affective links to places that they've never visited. Farnum et al. (2005) suggests that "strong bonds can and do form toward symbolic landscapes one has never visited" (p. 15). They believe that the affective bond to a place is more of a psychological process than a physical interaction, so people may have formed feelings for a place, and some emotional bond, before they ever actually encounter (visit or view) the place. The psychological process of affective bonding may be totally independent of a physical environment (e.g. attach to certain symbolic meaning, like national park, regardless its physical attributes), or may be elicited or hinted at by certain physical attributes. The results support the latter that it can be a psychological process, through which people would recall their previous

experiences and develop emotional bonds to a current environment. The results show that without any physical interaction with the place, the physical appearance (landscape aesthetic) would influence people's emotional bonds to that place. Since respondents have no chance to develop a specific bonding to the places shown in the pictures, such bonds must have been developed in their previous experiences. As Jones et al. (2000) proposed, people would have emotional links to a place when it looks or feels like somewhere they have associated with strong affective feelings.

The results also indicate that different components of the landscape aesthetic may contribute differently to respondents' emotional bonds to the landscape. Mystery was the most significant predictor among landscape aesthetic components, followed by complexity, legibility, and coherence. Consistent with their effects on landscape preference (Gifford, 2002, p. 73), all four landscape aesthetic components were positively correlated with emotional place bonding. The positive correlations suggest that when a landscape is more distinct or special (i.e., more mysterious, clear, understandable, or fancy), it is more likely that people will associate with it a strong affective bond. This point was further supported with the insignificant intercept in the regression model, which indicated that respondents would not have any affective bonds with a landscape if that landscape had no features (i.e., mystery, complexity, coherence, and legibility are all equal to zero).

Mystery and complexity were found to be more influential than coherence and legibility in forming emotional bonds to a place. Mystery and complexity represent a dimension of exploring the environment, and coherence and legibility represent a dimension of understanding the environment (Kaplan & Kaplan, 1989). In other words,

the results of the current study suggest that it may be more crucial for forming emotional bonds to a place if its physical appearance (landscape aesthetic) implies better opportunities for involvement or exploration, whether or not the opportunity is immediate (complexity), or inferential (mystery). Perceived opportunity for involvement with or exploration of a setting usually means that the setting affords interesting ways to engage with the environment. The result is consistent with the point made by Williams et al. (1992) that "attachment is likely to be stronger among individuals who focus on the setting itself relative to other aspects of the recreation engagement (i.e., activities and companions)" (p. 33).

The effects of mystery and complexity may also relate to habitat theory. Habitat theory suggests that people would prefer environments that are favorable for survival. For this reason, savanna-like landscapes, park-like landscapes, and landscapes with water features are more preferred by the general population (Balling & Falk, 1982; Burmil, Daniel, & Hetherington, 1999; Nasar & Li, 2004; Ulrich, 1974, 1986). A biological or innate basis of preference has been linked to people's attachment to places (Farnum et al., 2005; Low & Altman, 1992; Riley, 1992). When examining the responses to the study, most of the responses with high mystery and complexity were associated with forested landscapes, while responses with high legibility and coherence were associated with desert landscapes. Results also show that respondents had stronger emotional links to the forested landscapes compared to the desert landscapes. Therefore, the effects of mystery and complexity may also confound the effects of a vital habitat that provides basic biological needs, or may exist simply because the respondents were

more familiar with forested environments. Further study is needed to distinguish their effects.

INTEGRATED MODEL OF LANDSCAPE VISUAL PREFERENCE

The second model was hypothesized based on Nasar's (1989) symbolic model to incorporate the concepts of landscape aesthetic, emotional place bonding, and landscape visual preference (see Figure 5.2). The model was found to successfully fit the empirical data, as demonstrated in Chapter V (see Figure 5.5). Four mediation relations in the model (see Figure 5.6) were also tested.

The full model suggests that landscape visual preference is predicted by landscape aesthetics, while the effects are partially mediated by typicality and emotional place bonding (see Figure 5.5). While Nasar (1997) did not clearly indicate whether the mediation effect of the symbolic aesthetic (i.e., typicality and emotional place bonding) is a full or partial one, the current model suggests that the relation should be perceived to be a partially mediating effect. The standardized coefficient (0.7) indicated that landscape aesthetic is the primary predictor for landscape visual preference, and 49% of variance in landscape visual preference can be directly explained by landscape aesthetic. The results support those biologically based landscape preference theories that suggest that landscape visual preference is directly influenced by the physical environment, without associating any emotional/symbolic meaning with a landscape. The result also provides a plausible explanation of the prevalence of biological based theories in the existing literature. Many researchers have indicated the existence of common landscape visual preferences across different cultures or countries (e.g. Herzog et al., 2000; Hull &

Revell, 1989; Nasar, 1984; Tips & Savasdisara, 1986b; Yang & Kaplan, 1990; Yang & Brown, 1992; Yu, 1995). The current study provides a plausible theoretical model to explain the existence of cross-cultural preferences for landscapes.

Beyond the direct effect of landscape aesthetics on landscape visual preferences, the model also suggests that landscape aesthetics induce emotional bonding and lead to landscape visual preferences. That is, people will recall memories of when they interacted with similar places or when they viewed a particular landscape, and partially transfer those emotional bonds to the currently viewed landscape. This transferred emotional bond will further increase their preference for that place. As Jones et al. (2000) noted, people may have affective links to a new place that feels or looks like some place they associate with a strong emotion (e.g., their hometown), and people will develop certain levels of preference for that place.

The issue of an effect of landscape aesthetic on emotional place bonding has been discussed in the first research question. Because the four components of landscape aesthetics influenced emotional place bonding in the first model, it is not surprising that emotional bonding was also influenced by landscape aesthetics as a latent construct (in the full model). It should be noted that the effect of landscape aesthetics did decrease when typicality was included in the model as a mediator. The result suggests that the meaning of place should be considered when examining the effect of landscape physical appearance on people's affective bonding to the place.

The integrated model supports the effect of emotional place bonding on landscape visual preference. This is consistent with the argument about the attachment-like effect on landscape visual preference (Farnum et al., 2005). For example, Costonis

(1982) suggested that a resident's identity is the basis for their aesthetic response to a landscape (i.e., their landscape visual preference). Lowenthal (1978) also suggested that landscape preference would be influenced by an attachment to the landscape. Although the correlation between emotional place bonding and landscape visual preference has been empirically tested (e.g. Jones et al., 2000; Kaltenborn & Bjerke, 2002), the causal relationship cannot be distinguished because of their particular research designs. These two studies all focus on real places and the respondents were visitors or residents who had on-site interaction with these places. The relationship seems analogous to the case of the chicken and the egg: it cannot be determined if landscape visual preference was caused by emotional place bonding, or landscape visual preference helped to develop the emotional bonds to those places. The current study used landscape pictures to construct virtual places to prevent any on-site experience, so it was not possible for respondents to develop emotional bonds to those places at first sight. Hence, the effect of emotional place bonding on landscape visual preference can be confirmed in this study.

Although results suggest that emotional place bonding effects landscape visual preference, the coefficient is relatively small compared to the effects of landscape aesthetics. Lowenthal (1978) argues that an attachment to a place may overcome the landscape principles (landscape aesthetics) for preferred landscapes. With this limited effect, it is hard to image that emotional place bonding could overcome the effects of landscape aesthetics. One of the possible reasons may be the emotional bonding measured in this study is not developed toward the specific place through long-term interaction with the place, so may not be strong enough to overcome the effect of landscape aesthetics. It may be also possible that emotional place bonding is not only a

mediator, but also plays the role of moderator. In other words, there may be a negative interaction effect between landscape aesthetics and emotional place bonding. Thus, the physical appearance (landscape aesthetics) would not be so important for a preference to a place if people have a strong emotional link to the place, and this is the case that Lowenthal (1978) suggested. On the contrary, for those places with high landscape aesthetic levels, the effect of an emotional bond of place would not be so important. However, this discussion is beyond the scope of the current study, which follows the framework of a symbolic model. A detailed examination of the moderation-mediation effect is needed in the future.

The model also supports the effect of a landscape aesthetic on the meaning of the landscape, as measured by typicality to a national park. The typicality would further influence both landscape visual preference and emotional place bonding. The find is consistent with Stedman's (2003a) model that argues that the affective link to a place is a meaning-mediated model. In his model, certain landscape attributes would predict certain meanings related to the attachment to the place. Similarly, the current model suggests that physical appearance (landscape aesthetic) would positively predict the typicality of the place to a national park, and typicality would further predict respondents' emotional bonds to that place.

Typicality (to a national park) was also found to be a significant predictor of landscape visual preference in this model. That is, respondents had higher preference scores for a landscape when it looked like a typical national park. These results are consistent with other studies that have used typicality as a variable to predict landscape visual preference (e.g. Hagerhall, 2001; Peron et al., 1998; Purcell, 1992). Research has

suggested that landscape visual preference is related to typicality and that the relation is normally positive if the setting category is positively valued (Herzog & Stark, 2004). Although the path in current study is significant, the small coefficient (β=0.07; see Table 5.8) suggests that typicality to a national park had only a limited effect on landscape visual preference. Compared to the correlation coefficients 0.85 (park) and –0.35 (alley) in Herzog and Stark's (2004) study or 0.16 (Experiment 1) and 0.27 (Experiment 2) in the study of Peron et al. (1998), the effect of typicality seems to be small. However, in current study typicality alone could explain 41% of the variance in landscape visual preference in the regression model (β=0.64; see Table 5.11), which is comparable with previous studies. The standardized coefficient (β) dropped substantially from 0.64 to 0.29 when emotional place bonding was presented in the same model as a mediator. The effect of typicality on LVP was even smaller (0.07) when the effect of landscape aesthetic was controlled in the SEM model. Thus, the correlation between preference and typicality in the literature might be inflated without considering the effects of emotional place bonding and landscape aesthetics.

Although the effect of typicality on landscape visual preference is limited in this study, it should be noted that only one place meaning (national park) was used in the model. While a place can be associated with an infinite number of meanings, so a place also has infinite types of typicality to different meanings. Therefore, the typicality of a place is still an important factor for landscape visual preference.

One of the design variables for place meaning (place label) failed to elicit different responses (see Table 5.13). Four labels (national park, scenic area, local park, and commercial recreation area) that represent different place meanings were assigned

randomly to the landscapes to elicit different responses from respondents. The result was inconsistent with previous studies (i.e., Anderson, 1981; Hodgson & Thayer, 1980; Peron, Purcell, Staats, Falchero & Lamb, 1998) that suggested different place labels lead to different levels of preference for landscapes. A possible reason is that the respondents could not distinguish enough between the labels. The study supposed that the four labels represented different meanings: the national park represents a precious resource and also the spirit of the nation; the local park is a general environment; the scenic area is a place with high environment quality without any conservation or educational function; and the commercial recreational area represents a more artificial setting. The labels all have similar functional meanings and are relatively positive, as compared to some labels used in previous studies (e.g., commercial timber stand, leased grazing range, or road cut). Respondents might not have been able to distinguish the subtle differences, and therefore the labels failed to induce different responses. Further study is needed to examine the effects of place labels on emotional bonding to places.

THEORETICAL IMPLICATIONS

This research provides empirical support for Nasar's symbolic model, by combining physical and symbolic components in an attempt to predict landscape visual preference. The dichotomous perspective on environmental perception theory has been repeatedly suggested by different researchers. For example, Proshansky, Ittelson, and Rivlin (1970) indicated two major approaches to environmental psychology: one defines the environment in "purely physical and objective terms," and the other is a phenomenological approach which denies the importance of the physical environment

and argues that "behavior springs not from the objective properties of the stimulus world 'out there' but from that world transformed into an 'inner world' or psychological environment by an inherently cognizing organism" (p. 28). Similar distinctions can be found in the study conducted by Zube et al. (1982) which separates the theories based on "the explicit or implicit concept of the human" and theories based on "the salient properties or characteristics of landscape." More recent studies have followed the same stream of thought. For example, Jones et al. (2000) suggested that the two main approaches for understanding landscape quality are a visual preference framework, and the perspective of affective bonds to landscapes. Since each of the two perspectives has its own line of literature and methodology, the integrated model used here helps to provide a new framework for use in considering and testing the human-landscape relationship. This study was an attempt to reach a middle ground between the two approaches that Farnum et al. (2005) have suggested is needed.

The model proposed in this study provides a framework for landscape visual preference research to incorporate the abstract symbolic values of landscapes. Research on landscape visual preference has been focused on the physical environment for a long time (Newell, 1997). This study demonstrates that abstract meaning of emotions associated with the landscape can influence preferences for that landscape, although the physical appearance (landscape aesthetic) had a larger effect. The stronger effect of landscape aesthetics supports Bourassa's (1990) hierarchical framework that suggests that phylogenesis (biologically based) theories account for the fundamental reactions to environment. Therefore, the arguments of Relph (1976) that "appearance of landscapes are little more than a backdrop of relatively trivial importance" (p.33) may not be fully

correct, at least on the case of landscape visual preference. The physical appearance of a place, as well as its symbolic meanings, both play significant roles in people's visual preference for a place and that place is more than a backdrop. The physical environment of "place" contributes to human experience in much the same way that the people in it do.

Basically, symbolic aesthetics represent the sociogenetic (culturally based) and ontogenetic (individual) evaluations of environment (Bourassa, 1990), so the integrated model can help to explain the effects of cultural difference and familiarity on landscape visual preference. The cultural or insider-outsider difference has been considered to be an important factor that influences the preference on landscapes, but many existing studies did not explain why that difference exists. The current model suggests that cultural differences may come from shared emotional place bonding. People with similar cultural backgrounds may associate symbolic meaning with a certain type of landscape (stereotype), and would prefer a landscape according to its similarity to the stereotype (i.e., typicality). Similarly, the current model can be used to explain the effects of familiarity on landscape visual preference. Familiarity is considered to be one of the most important factors for landscape perception research (Kaplan & Kaplan, 1989), but its effect cannot be ascertained because supports for both preferring familiar landscapes and preferring different landscapes can be found in the literature. Since familiarity can be one type of emotional bond to a place (Hammitt et al., 2006; Hammitt & Cole, 1998), it can be incorporated in the current model for further study.

This study also suggests that the effect of place meaning (measured as typicality to a national park) on landscape visual preference is largely mediated by emotional place

bonding. The effect of typicality in this study was not as large as the literature indicated it might be. More recent studies have suggested that the value of the stereotype place must be considered when examining the effects of typicality on landscape preference (Herzog & Stark, 2004), because the direction of correlation between landscape preference and typicality is influenced by the value of the stereotype places (e.g. park versus streetscape). This study did not examine what a national park might mean to respondents, nor anything about their past experience with such places. Further studies are needed to examine the issue along with the concept of emotional place bonding.

The mediator role of emotional place bond also suggests that affective bonds are influenced by typicality of place. Therefore, the concept of schema discrepancy may be adopted to explain the development of emotional place bonding. That is, one's emotional bonding to a new place may be influenced by its similarity to the archetypal place to which one previously had strong emotional bonds. A similar idea of archetypes for emotional bonding has been suggested by Tuan (1974) in his seminal work *Topophilia*. Tuan specifies four archetypical environments for topophilia (love of place), including the tropical forest, seashore, valley and island. Tuan believes that any place has "the power to command the allegiance of at least some people," but the four main archetypes are the "environments of persistent appeal." Thus, the stereotypes may influence the development of emotional bonds to other places.

The use of landscape pictures as stimuli in this study suggests that some level of emotional place bonding can be elicited visually, without interacting with the place directly. Before people develop an affective link with a specific place through physical interaction, they may have some preexisting propensity for bonding due to previous

experience. This point is similar to Hammitt's multidimensional perspective of place bonding (Hammitt, Backlund, & Bixler, 2004; Hammitt et al., 2006; Hammitt & Cole, 1998; Hammitt & Stewart, 1996, c.f. Bricker (1998)), which argues that the emotional bonds with a place can be classified into five different types, including everything from a sense of knowing and recognition (place familiarity) to a feeling of being completely at home (place rootedness).

Combining the current model and Hammitt's concept, we can distinguish two types of emotional place bonding. One is a more temporal and general bonding that is transferred from previous experiences or bonds, and the other is a more permanent and specific type of bonding that is developed from long-term interaction with a specific place. Because visual preferences for landscapes depend on physical elements, the level of preference is more specific to a certain environment. Landscape preference is also a temporal satisfaction-like response to a place (Hammitt et al., 2006). A way of thinking about the possible relationship between landscape preference and emotional bonding is displayed in Figure 6.1. For people who visit a new place (place A), their landscape visual preference is influenced by the initial emotional place bonding, which is influenced by their experience in another, possibly similar, place. Their preference for place A will then somewhat determine their level of bonding to the place, along with other factors. For non-residents, or those who left place A, the specific place bonding will influence their initial emotional bonding when they revisit place A. For residents, or who stay in the place A, the specific place bonding will influence the landscape preference directly and continuously. When these people visit another new place (place B), their specific bonding to place A would influence the initial general type of bonding

to place B. The whole process as described for place A will happen again in place B based on this conceptual framework. Further study will be a benefit if it compares and combines the current model with Hammitt's multidirectional place bonding in the future.

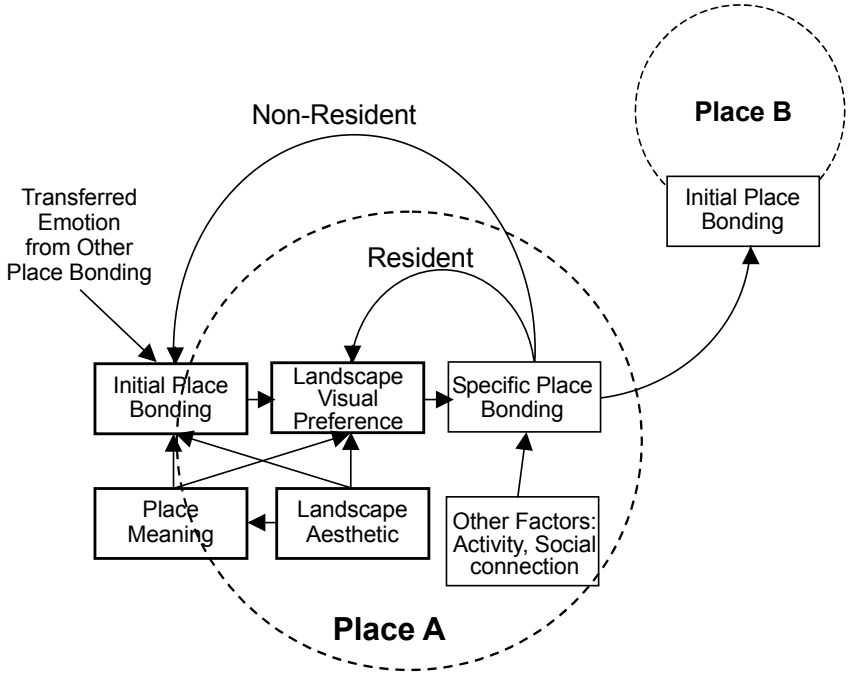

Figure 6.1 The Concept of the Relationship Between LVP and EPB

MANAGEMENT IMPLICATIONS

Landscape visual preference is an important managerial tool for recreation, tourism and residential settings (Scenic America, 1999). Researchers have agreed that the tourism and recreation phenomenon is heavily associated with the aesthetic

experience of landscapes (Fairweather & Swaffield, 2002; Manning & Freimund, 2004; Meitner, 2004; Rossman & Ulehla, 1977; Shafer & Mietz, 1969; Stewart & Floyd, 2004). The preferred natural environments were found to elicit better moods and higher levels of concentration (van den Berg et al., 2003) and therefore were more restorative (Korpela & Hartig, 1996). Research also suggests that a positive community image is associated with the aesthetics of the landscape features (Green, 1999). Therefore, one of the major implications of this study is to help identifying ways of improving the quality of tourism and recreation environments.

While the traditional approaches of understanding landscape preference focus on the physical elements (Newell, 1997), the current study argues the importance of balancing both the physical and symbolic aspects of landscape. The study here suggests that landscape visual preference is predicted by the physical and symbolic attributes of the particular landscape. Each landscape has its particular physical attributes such as size, form, or color, and its symbolic attributes like wilderness or urban area. Since both physical and symbolic attributes are interdependent, it is important to understand the balance between both aspects when managing the landscape. If only the physical attributes are considered when managing the landscape, certain meanings may be neglected. Some people may associate special meanings or emotions with certain landscapes, and that association may be destroyed when the landscape is changed. In such a case, the preference for the landscape will decrease for those people even though the aesthetic value increases. For example, human influences such as mowing, pruning, or an abundance of flowers in natural setting often increase people's preference for the landscape (Kaplan et al., 1998). However, for people who attach to wilderness, human

influences may decrease preferences for the place. On the other hand, if management effort was only put into maintaining the symbolic attributes of the landscape, the physical quality of the environment may be degraded while the attachment left intact (Stedman, 2003a). Just like keeping a historic site or a wilderness area intact may be symbolically or emotionally meaningful to some people, but the landscape may not be visually preferred by other people. Similarly, when people have high levels of emotional bonding with a place or attach to its symbolic meaning, they may be insensitive to a certain range of environmental degradation. Therefore, Nasar (1997) has indicated the necessary issues for decision makers to consider when they analyze the relationship between physical attributes, meanings, and preferences. The integrated framework suggested here contributes to the perspective that emotional bonding (or attachment) can be elicited or "called up" through visual images and can contribute to preference. A better understanding may assist with environment management and to by pointing to ways to mitigate the impact of development.

This study also indicated that emotional place bonding was influenced by landscape aesthetics. People's affective association with a place, and thus preference for a place, may be manipulated through physical appearance. When the physical landscape of a lost place (in disaster or war, for example) is recreated, the landscape may bring back a certain level of emotional bonding that people used to have. Similarly, when people have strong emotions associated with a place, changing the landscape and decreasing its typicality may weaken people's bonding to the place. Keeping the landscape or image that people desired may help to maintain people's emotional bonds through some level of authenticity in the place.

The results of the study also suggest that it is possible to increase people's visual preference for a place without changing the physical landscape. Since both physical and symbolic meanings can influence landscape visual preference, it is possible to increase the visual preference by manipulating the meaning of the place. For example, existing literature has shown that designating a special title (e.g., wilderness area or national park) to a place may increase people's preference (Anderson, 1981; Hodgson & Thayer, 1980), even though the landscape is the same. Changing place meaning by education or interpretation may also change people's preference for a place. Kearney (2001) indicates that the information of forestry management practices would increase preference for the landscapes degraded by these practices. Other studies have also shown that information has the capacity to change the visual preference of landscapes (Becker, Dottavio, & McDonald, 1988; Buhyoff et al., 1978). Therefore, it is important for resource managers to implement an information program to market the desired meaning of a place in order to maintain a user's preference for that place. Besides, emotional associations with a place can be enhanced through involvement, so public participation and voluntary tours many help to increase visual preference for a place.

Since changing the meaning of places can be used to remedy the negative changes of landscape preferences, including such approaches should be considered by the Visual Absorption Capability management (VAC) (Anderson, Mosier, & Chandler, 1979; USFS, 1995; Yeomans, 1979). VAC is defined as the ability of a "landscape to accept human alteration without loss of landscape character or scenic condition" (USFS, 1995, p. C-1). It is an important criterion for site development, especially in a natural environment or in a place sensitive to alteration. The traditional approach is to determine

the ability of a landscape to visually absorb alterations from a biophysical perspective (e.g., slope, vegetative cover, soils and geology). The current study shows that symbolic meanings have an effect on landscape visual preference, as well as the physical elements. In other words, landscapes would have different levels of VAC according to their symbolic meanings. For example, a commercial timber farm may be robustly accepting to a large scale of landscape change, while a religiously sacred land is sensitive to minor alternations.

One thing that should be noted is that people are often aware of their emotional bonding to a place when the landscape is changed; it may be helpful to keep the scale of changes small before we can be sure of the effects of symbolic meaning. Kaplan (1996) suggests that the alteration should be small and experimental when the influence of change is unclear. Through small, experimental changes in the landscape, we can gain time to evaluate our decisions and public feedback before applying those changes to the whole system.

Researchers have indicated that preferred landscapes may improve mental health (Hartig, Mang, & Evans, 1991), reduce stress (Ulrich, 1981), improve mood and concentration (van den Berg et al., 2003), and offer better recovery effects for mental fatigue (Staats, Kieviet, & Hartig, 2003). Much of the past research has focused on the restorative effects of the physical environment, especially the natural environment. Since current studies suggest that landscape visual preference can be enhanced by symbolic place meaning, we can expect that a place with which people associate strong emotion may also have restorative power. The point is partially supported by Korpela's (1996) work, which found that compatibility (a sense of belong to a place) is one of the most

important components for a restorative place. A positive relationship between health seeking and place attachment was also found in the study of Kyle et al. (2004). Therefore, a restorative place not only can be created with certain physical elements like a natural environment, but can also be created with environments with symbolic meanings, e.g., historical districts, or sacred places.

The current study demonstrates that symbolic meanings can be elicited with physical landscapes (landscape aesthetics). In other words, certain landscape elements may carry symbolic meanings directly or indirectly. The results suggest a possibility of recreating a sense of place to a certain degree, which can be applied to historical preservation or environmental restoration. By identifying these critical elements, certain places can be preserved or recreated without losing much of the emotional attachment people associate with them.

RECOMMENDATIONS FOR FUTURE RESEARCH

This study has made an effort to fill in the gaps recognized by this researcher. However, like any previous study, this one has limitations that should be addressed in the future.

The participants in this study were all college students, a pool which should be more diversified in future studies. The focus of the study was to test the feasibility of the hypothesized model. Since the main purpose was to test these relationships, the representativeness of the research sample was not the only priority. However, it is possible that the hypothesized relationships only exist, or behave very differently in a sample of the type used here. Especially when the student sample used here was

homogenous in terms of a socio-demographic background, it is likely for respondents to have similar value systems. Future studies should be conducted with a more representative sample of the general population.

Another concern here was sample size. The sample size of the study is relatively small, compared to some studies in recreation or tourism. However, the sample size is not unusual for landscape perception research, because each respondent usually rates more than one landscape. Larson and Delespaul (1992) indicates the two levels of data in psychological experiences study are person level and situation level; which person-level data uses subject as unit of analysis, and situation-level uses individual self-report as unit of analysis. The numbers of case in situation-level data are usually larger than person-level data because a person would provide more than one response. Because the focus of studies is the rating of responses instead of individuals, the sample size is not as great a concern. The current sample size is not unusual for landscape related studies. A review of 114 landscape perception studies showed that the mode of respondent numbers is approximately 100 (Stamps, 1992). Stamps (1996) indicated that for landscape preference studies, 0.93 of a split-half sample correlation can be achieved with 30 respondents, and the marginal benefit of respondent sizes would decrease rapidly. Researchers have suggested that using situation-level data may increase chance of type I error because of the inflated sample size (Larson & Delespaul, 1992). However, all of the statistical analyses meet the significance level of 0.001, so the chance of making type I error in this study is in the acceptable range. Although the sample size is acceptable for the purpose of analysis, it will become a concern when making a comparison at a

personal level. It will be appropriate to obtain a larger sample in a future study, especially when the research interest is directed towards personal differences.

Research has indicated the possible bias of the halo effect (artifact) when a respondent provides more than one judgment (Herzog & Stark, 2004; Peron et al., 1998). The halo effect may occur when a respondent answers questions based on their perception of previous questions rather than the specific stimuli (in this case landscape pictures). For example, people might express high level of emotional bonding falsely just because they had high level of preference to the landscape, rather than having actual bonding to the landscapes. The suggested remedy is letting respondents provide one judgment each time so that respondents cannot compare their judgments. The halo effect was not considered a major issue in this research based on Stamp's (2005) assertion. Stamps (2005) compared studies that used single responses and multiple responses and concluded that using the same participants for multiple responses did not produce a halo effect. However, a possible halo effect was found in current research that respondents provided similar judgments for legibility and coherence. It is worthwhile to use different research designs in the future to guard against a possible halo effect.

The study used structure equation modeling to test the hypothesized relationships. SEM is based on linear relationships. However, the relationships in landscape perception may not necessarily be linear. For example, the relationship between landscape preference and level of environment stimulation may be a reverse-U shape, rather than linear relation (Porteous, 1996; Russell, 1976; Wohwill & Kohn, 1976). In other words, an environment that is either too complicated or too boring will not be preferred. The

model proposed in this study should be re-tested for the possibility of such a non-linear relationship.

The current study was intended to examine a general response to landscape, so the context of the evaluation was not controlled. Many researchers have indicated that responses to landscapes will be varied in different contexts (Hull & Stewart, 1992; Ryan, 2005; Stokols & Shumaker, 1981). Therefore, it would be worthwhile to apply the model under different contexts (e.g., different activities, travel/work), or to conduct an on-site experiment in the future. Ultimately, only one place meaning (national park) was included in this model. It would also be worthwhile to retest the model and the effects of typicality using different place meanings (labels). Results here may also have been influenced by the types of landscape viewed (e.g., forested landscapes have higher mystery and complexity rating) and respondents' familiarity with the landscape. Future research would benefit from repeating the study with more diverse landscape types.

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APPENDIX I

LANDSCAPE PICTURES

Pictures of Big Bend National Park (US)

Picture #101
LVP=2.6, EPB=2.0, LA=2.9, TYP=2.1

Picture #102
LVP= 4.7, EPB= 3.6, LA= 4.7, TYP=4.4

Picture #103
LVP= 5.8, EPB= 4.5, LA= 5.6, TYP=5.7

Picture #104
LVP= 5.3, EPB= 4.1, LA= 5.1, TYP=5.3

Picture #105
LVP= 4.4, EPB= 3.8, LA= 4.4, TYP=4.2

Picture #106
LVP= 4.1, EPB= 2.9, LA= 3.9, TYP=4.0

Picture #107
LVP= 5.4, EPB= 4.3, LA= 5.1, TYP=5.4

Picture #108
LVP= 4.2, EPB= 3.1, LA= 4.0, TYP=4.1

Pictures of Big Bend National Park (US)- Continued

Picture #109
LVP= 3.8, EPB= 2.7, LA=4.0, TYP=3.1

Picture #110
LVP= 3.9, EPB= 2.9, LA= 3.8, TYP=4.1

Picture #111
LVP= 4.9, EPB= 3.6, LA= 4.7, TYP=4.9

Picture #112
LVP= 4.6, EPB= 3.6, LA= 4.3, TYP=4.5

Picture #113
LVP= 4.7, EPB= 3.7, LA= 4.7, TYP=4.1

Picture #114
LVP= 4.4, EPB= 3.6, LA= 4.6, TYP=4.1

Picture #115
LVP= 5.3, EPB= 4.1, LA= 5.2, TYP=5.4

NOTE: LVP: Landscape Visual Preference; EPB: Emotional Place Bonding; LA: Landscape Aesthetic; TYP: Typicality (to a National Park)

Pictures of Kenting National Park (Taiwan)

Picture #201
LVP= 4.2, EPB= 3.1, LA= 4.1, TYP=3.7

Picture #202
LVP= 5.6, EPB= 4.0, LA= 5.3, TYP=3.8

Picture #203
LVP= 5.4, EPB= 4.2, LA= 5.1, TYP=4.7

Picture #204
LVP= 5.5, EPB= 4.7, LA= 5.0, TYP=4.8

Picture #205
LVP= 3.4, EPB= 2.5, LA= 3.5, TYP=2.8

Picture #206
LVP= 5.1, EPB= 3.8, LA= 4.7, TYP=4.8

Picture #207
LVP= 5.6, EPB= 4.6, LA= 5.4, TYP=5.1

Picture #208
LVP= 5.4, EPB= 4.3, LA= 5.2, TYP=4.9

Pictures of Kenting National Park (Taiwan)- Continued

Picture #209
LVP= 2.7, EPB= 2.0, LA= 3.2, TYP=1.9

Picture #210
LVP= 4.3, EPB= 3.0, LA= 4.1, TYP=3.2

Picture #211
LVP= 5.2, EPB= 4.2, LA= 4.9, TYP=4.5

Picture #212
LVP= 5.1, EPB= 4.0, LA= 5.0, TYP=4.5

Picture #213
LVP= 4.9, EPB= 4.1, LA= 4.7, TYP=3.9

Picture #214
LVP= 4.7, EPB= 3.4, LA= 4.5, TYP=4.2

Picture #215
LVP= 3.7, EPB= 2.8, LA= 3.6, TYP=3.0

NOTE: LVP: Landscape Visual Preference; EPB: Emotional Place Bonding; LA: Landscape Aesthetic; TYP: Typicality (to a National Park)

APPENDIX II

PANEL JUDGING SURVEY

Example of Panel Judging Picture Exhibition Pages

Click on the thumbnails for larger picture

Part of Panel Judging Form

LVP Expert Panel Judging Form

Please rate following attributes of the scenes in the pictures. Pictures are on
http://www.rpts.tamu.edu/grads/ckcheng/panel/index.htm
It will probably take 1.5 to 2 hours to finish it.

Definition of Terms

Complexity (CM): the number of different visual elements in a scene: how intricate the scene is; its richness.

- How much is going on in the scene?"
- How much is there to look at?

Coherence (CO): order and organization "the patterns of brightness, size, and texture" in the scene.

- How well does the scene hang together?
- How easy is it to structure and organize the scene?

Mystery (MY): a scene's depth, and hidden qualities that may draw one closer, to explore and gain more information. The scene "invites one to a distant, but new vantage point."

- How much do you think the environment promises more to be seen if you could walk deeper into it?
- Does the environment seem to invite you to enter more deeply into it and thereby learn more

Legibility (LE): understanding an environment and "to comprehend and to function effectively" as the environment provides cues and landmarks that assist, for example, with way-finding.

- How well do you feel that you can find the way in and back from the scene?
- How easily you can tell what is being depicted in the scene?

Landscape Visual Preference (LVP): the degrees of like or dislike for the visual appearance of a place as compared to another

---

Please save the form with your ratings and mail it back to chiakuen@neo.tamu.edu; or print it and sent it to MS 2261 Chia-Kuen Cheng.
Thank you very much!!

Part of Panel Judging Form (continued)

Please rate the attributes of each scene from lowest [1] to highest [100]:

No.	MY	CM	CO	LE	LVP
1.					
2.					
3.					
4.					
5.					
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APPENDIX III

SURVEY QUESTIONNAIRE

Information Sheet

INFORMATION SHEET

Thank you for participating in this study, **EXAMINING LANDSCAPE VISUAL PREFERENCE--THE RELATIONSHIP BETWEEN LANDSCAPE AESTHETICS AND EMOTIONAL PLACE BONDING**. The purpose of this study is to understand the way people feel about places. The survey will take about 20 to 30 minutes to complete.

By responding to this survey you acknowledge:
-your participation is voluntary;
-your identity will remain anonymous;
-the IP address of your computer will not be recorded;
-you can elect to withdraw at any time without penalty;
-there are no positive or negative benefits from responding to this survey;
-there is no compensation;
-the survey will be used for research;
-the results will be printed and kept for 3 years in a locked file and then destroyed;
-the data obtained from the survey may be published;

If you have any questions, you can contact you can contact C.K. Cheng, Department of Recreation, Park, and Tourism Sciences at (979) 845-6538, chiakuen@neo.tamu.edu, or Dr. Scott Shafer at (979) 845-3837, sshafer@tamu.edu.

This research study has been reviewed by the Institutional Review Board - Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, you can contact the Institutional Review Board through Ms. Angelia M. Raines, Director of Research Compliance, Office of the Vice President for Research at (979)458-4067, araines@vprmail.tamu.edu.

If you agree with the above information, please click on the start button to access the link to complete the survey.
Thank you very much!!

START

Demographic

Demographic http://127.0.0.1/diss/lvp02.htm

Please enter your ID : (last 6 digits of UIN)
What is your major? (ex: LAND)
Your gender is: Male Female

In what year did you born? 19
Had you received any design, art, or other aesthetic related education/training?
Yes No Not Sure

Are you color blind?: Yes No

NEXT

Instructions for the Baseline Pictures

Introduction http://127.0.0.1/diss/lvp04.htm

Please review the following 5 pictures. They give you some idea of the types of scenes you will be asked to score.

- Please do not use the "BACK" function in your browser.

BEGIN

Baseline Pictures Page

Baseline 1 http://127.0.0.1/diss/lvp05.asp?Order=1

Note: This page showed 5 different pictures with 5-second interval

Instruction for the Sample Page

Intro http://127.0.0.1/diss/lvp06.htm

The next page is an example of the types of questions that will be presented after each scene.

Please do not answer these questions. They are only an example

- Do not use the "BACK" function in your browsers.

BEGIN

Sample Page

Picture Questions http://127.0.0.1/diss/lvp07.htm

	Not at All						Very Much
How much do you like the setting in the picture?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
Please rate the scenic beauty for the scene in the picture?	[ ] (from 0 to 99)						

	Not at All						Very Much
How much is in the scene to look at?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
How much do you think the scene promises more to be seen if you could walk deeper into it?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
How easy is it to structure and organize the scene?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
How easily can you tell what is being depicted in the scene?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

	Not at All						Very Much
How willing would you be to call the setting a **National Park**?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
How much does it seem like a typical **National Park**?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

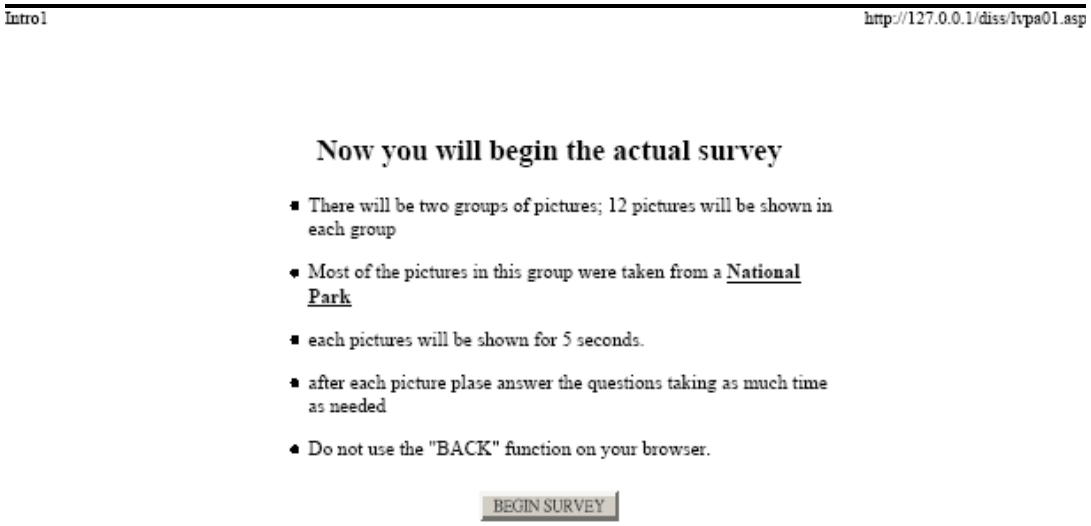
	Strongly Disagree						Strongly Agree
I feel the setting in the scene is a part of me	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I identify strongly with the setting in the scene	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I feel very attached to the type of setting in this scene	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
The setting in the scene is the best place for an activity I would like to do	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I would get more satisfaction out of visiting the setting in the scene than any other	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I would prefer to do an activity I enjoy in this setting more than in any other place	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

NEXT

1／1

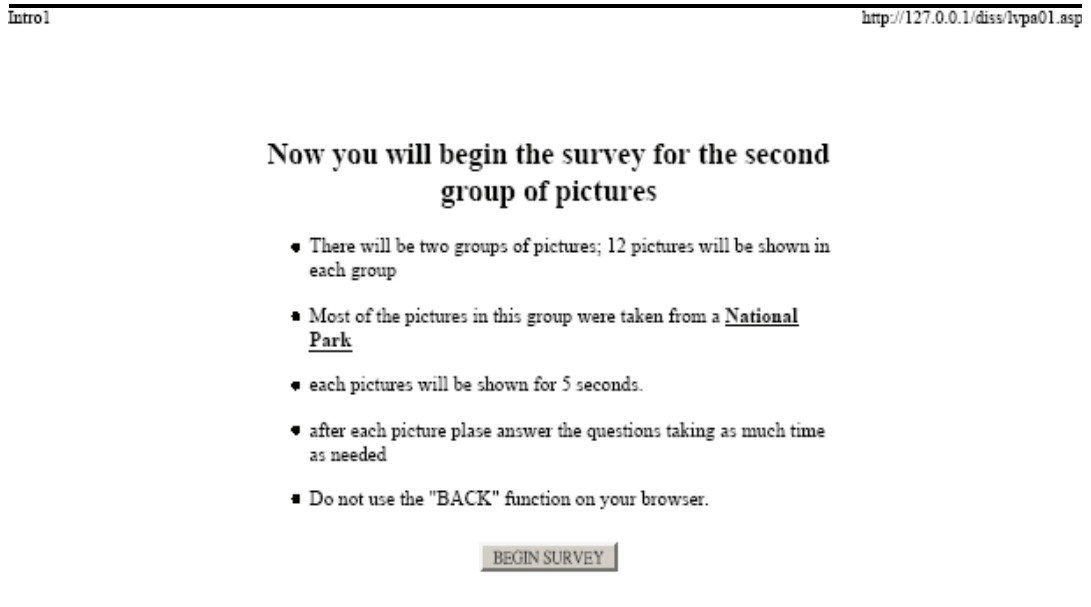
Note: This is a sample page that would automatically jump to next page after 5 seconds

Introduction Page—the First Site



NOTE: The label would be “National Park” for the US site. The label would be assigned randomly for the remote site.

Introduction Page—the Second Site



NOTE: The introduction page for the second group of picture. This page was shown when respondents finished rating the first group of pictures. All settings are the same as the first one.

Picture Exhibition Page

Survey Picture http://127.0.0.1/diss/lvpa02.asp?Order=0

NOTE: This is the picture exhibition for the actual survey. This page would automatically jump to the question page after 5 seconds

Question Page

Picture Questions http://127.0.0.1/diss/1vpa03.asp?Order=0

	Not at All						Very Much
How much do you like the setting in the picture?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
Please rate the scenic beauty for the scene in the picture?	[ ] (from 0-low quality to 99-high queality)						

	Not at All						Very Much
How much is in the scene to look at?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
How much do you think the scene promises more to be seen if you could walk deeper into it?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
How easy is it to structure and organize the scene?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
How easily can you tell what is being depicted in the scene?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

	Not at All						Very Much
How willing would you be to call the setting a **National Park**?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
How much does it seem like a typical **National Park**?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

	Strongly Disagree						Strongly Agree
I feel the setting in the scene is a part of me	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I identify strongly with the setting in the scene	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I feel very attached to the type of setting in this scene	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
The setting in the scene is the best place for an activity I would like to do	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I would get more satisfaction out of visiting the setting in the scene than any other	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I would prefer to do an activity I enjoy in this setting more than in any other place	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

NEXT

NOTE: This page would link to the introduction page for the overall rating, after rating 12 sets of picture.

Introduction Page—Overall Rating

Intro2 http://127.0.0.1/diss/lvpb01.asp

The next group of questions should be answered based on all 12 of the previous scences you have just reviewed

- There is no time limit for answering the questions.
- Do not use the "BACK" function in your browsers.

START

Overall Rating Page

Overall Landscape Questions http://127.0.0.1/diss/lvpb02a.asp

Please respond to the follwing items based on your overall impression about this National Park you just saw:

	Not at All						Very Much
How much do you like the landscape of this National Park?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
Please rate the scenic beauty for this National Park?	[ ] (from 0-low quality to 99-high queality)						

	Not at All						Very Much
How willing would you be to call the setting a **National Park**?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
How much does it seem like a typical **National Park**?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

	Strongly Disagree						Strongly Agree
I feel the National Park is a part of me	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
This National Park will be the best place for an activity I would like to do	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
This National Park would be very special to me	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I feel that no other place can compare to this National Park	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I identify strongly with this National Park	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I would get more satisfaction out of visiting this National Park than from visiting any other place	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I am very attached to this National Park	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I would prefer to do an activity I enjoy in the National Park more than in any other place	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
Visiting this National Park would say a lot about who I am	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
Doing the activity I would like to do in this National Park I would enjoy just as much at another site	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I feel this National Park means a lot to me	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
I would not substitute any other place for doing the activity I would like to do in this National Park	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

NEXT

NOTE: The sequence of doing LVP or EPB questions was assigned randomly. This page would link to the introduction page of the second site, or link to finishing page if the respondent has finished two sites.

Finishing Page

Intro1 file:///D:/Inetpub/wwwroot/Diss/lvpc00.htm

You just completed the survey!!

Thank you for your participation and patience

COMMENTS or SUGGESTIONS??

Comments and Suggestions Page

file:///D:/Inetpub/wwwroot/Diss/lvpcontact.htm

Comments and Suggestions

Please enter your...

Name: Your name here

E-Mail address: me@rps.tamu.edu or if you prefer anonymity leave as is

Please enter your comments or suggestions here...

SEND RESET

NOTE: This page was used to send the author comments and suggestions with e-mail.

VITA

CHIA-KUEN CHENG

PERMANENT ADDRESS

TAMU 2261 College Station, Texas 77843-2261

EDUCATION

2007 Ph.D. Department of Recreation, Park & Tourism Sciences,
Texas A&M University, Texas

1995 M.S. Graduate Institute of Horticultural Science- Division of Landscape Horticulture
National Taiwan University, Taipei, Taiwan

1993 B.S. Department of Horticulture
National Taiwan University, Taipei, Taiwan

WORK EXPERIENCE

09/2001-08/2006 Research Assistant, Texas A&M University

06/1999-06/2001 Landscape Engineer, Lungmen Construction Site (The 4th Nuclear Power Plant) of Taiwan Power Company, E&C Engineering Corporation

09/1997-06/1999 Project Researcher, ROC Outdoor Recreation Association

07/1995-06/1997 Lieutenant, Army (Platoon Leader, Logistics Officer)

07/1993-06/1995 Part-time Research Assistant, Dept. of Horticulture, NTU

02/1994-05/1994 Teaching Assistant (Landscape Engineering and Practice I), Dept. of Horticulture, NTU