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LANDSCAPE PERCEPTION DIFFERENCES BETWEEN AMERICAN AND TAIWANESE STUDENTS

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By

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ABSTRACT

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By

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The purpose of this exploratory study was to test cultural differences in preferences for and familiarity with selected American and Taiwanese landscapes. In addition, subjects were asked to rate their acceptance of various levels of development in the natural environment. There were 189 American students at Michigan State University and 287 Taiwanese students in Universities in Taiwan who served as subjects. Using color slides as stimuli, significant differences in landscape preferences were observed between these two groups for selected landscape types, mountainscapes and waterscapes. A psychophysical model of landscape quality assessment was employed in this study. American subjects preferred the superior position to view landscapes, while Taiwanese preferred the inferior viewing position to watch scenery. The comparison of acceptable levels of development in natural settings across these two student groups suggested differences as well. Americans tolerated more development in the natural environment than did the Taiwanese. Familiarity scores showed a modest but significant positive relationship with landscape preference ratings. Discrepancy in perceptions

were recorded across detailed landscape features such as observer's position, water conditions, and the distance between water and observer. The relationship between landscape preferences and acceptable levels of environmental development was both positive and significant. This study corroborated the results of previous research suggesting that different landscape perceptions are associated with different cultural backgrounds (Zube, 1984, Herbert & Kaplan, 1987). Moreover, subtle perception differences in landscape perceptions provide useful information for landscape design, planning and development.

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INTRODUCTION

The Landscape

Of the physical world, land is a major component on the earth. Land becomes landscape when it is described or seen with its physiographic and environmental characteristics (Laurie, 1975). Originally, in the Dutch and German languages, the term "landscape" and "Landscahaft" referred to the notions of "territory", and "region". Later on, this term was used for visible surroundings, and eventually new terms such as "seascape" and "townscape" evolved. German geographers used the term "landscape" not only for representing territorial or visible scenery, but also to represent a broad range of living and non-living phenomena covering the earth's surface. Therefore, landscape includes both natural geographical variation and the human-influenced environment. Zonneveld (1990) gives landscapes the following characteristics:

1. They each occupy a certain space, a territory: they can be represented on a map.
2. They possess visual forms and patterns: a physiognomy that can be depicted in paintings or photographs.
3. They are "functioning" dynamic systems, consisting of a variety of components and processes that influence each other.
4. They passed--like all things on earth--through a sequence of situations, in other words: they have gone

through an evolution, a history. (p.7)

On the basis of this set of characteristics, it appears that "landscapes" include not only natural landscapes but also cultural landscapes. A "natural landscape" indicates no human influences on the natural processes and conditions in the setting. On the other hand, "cultural landscape" refers to human influenced activities. "Cultural landscape" expresses directly the values that derive from human development, modification, change, or replacement of the original scenes of nature at any given time and place. Landscapes reflect different characteristics of particular cultures; for example, landscapes in the East are less systematic, whereas Western landscapes are more geometric.

Major systematic analysis of the "landscape" occurred during the decade of the 1960's and in the early 1970's. During this time period, legislation was enacted focusing upon the landscape, resulting in wild and scenic rivers, scenic and recreational trails, and scenic highways. In addition, legislation required environmental impacts for major development projects, including aesthetic impacts. Individuals from many disciplines and professions such as forestry, geography, landscape architecture, psychology, environmental studies, and recreation have concentrated on landscape perception and assessment research. To date, an abundant volume of literature has been published in the area of

landscape perception and preference (e.g., Zube et al., 1982).

Since culture is one of the major factors that influences landscape formation, cross-cultural studies involving landscape perception and preference have raised the question: to what degree do cultural factors influence landscape preference? Among landscape preference studies, the role of culture as a variable has been examined. One group of researchers has found relatively similar perceptions when people shared similar cultural backgrounds (Zube, 1984; Shafer & Tooby, 1973; and Ulrich, 1977). In contrast, another group provided evidence that culture is a distinct determinant of landscape preference (Sonnenfeld, 1967; Zube & Pitt, 1981; Herbert & Kaplan, 1987; and Yang, 1988).

In the literature over the years, few studies (Nasar, 1984; Berlyne et al., 1974; and Yang, 1988) have compared landscape preferences between Western and non-Western subject groups. In the review of the literature, no study has been found that compares landscape preferences between Taiwanese and American groups.

Purposes and Hypotheses

The main purpose of this study is to compare the visual preferences of Taiwanese and American groups for different landscape types and elements. The results of this study could contribute to a better understanding of cross-cultural differences and similarities in environmental perception.

These results could assist landscape designers and managers in project design and planning.

Other purposes of this thesis are to compare landscape preferences for environmental development levels across the two cultures; to identify socio-demographic variables that may be related to cultural differences observed; and to assess familiarity and document its relationship to landscape preference.

This study will address the following hypotheses:

(1) American and Taiwanese students will report different landscape preferences for and opinions about levels of environmental development.

(2) Ratings of familiarity with a landscape are positively and significantly related to landscape preference ratings for each cultural group.

LITERATURE REVIEW

Culture and Environment

Studies of environmental perception and preference have indicated that preference for natural settings is remarkably consistent across the general American population (Zube, 1984). Yet, variations occur between people of different demographic, ethnic and cultural backgrounds, and areas of expertise. From the perspective of different cultures, the studies of preference have suggested that there is a high degree of homogeneity in those of similar cultural backgrounds. For those of different cultural backgrounds, landscape perception differences have been observed (Yang & Terry, 1992).

The term "culture" is comprehensively used in social psychology, sociology, and anthropology. A simple and broad definition of culture was presented by anthropologist Herskovits (1952). He argued that human culture is the human influences portion of the environment. In addition to this simple definition, Altman & Chemers (1984) provide four components of culture:

1. culture refers to beliefs and perceptions, values and norms, customs and behaviors of a group or society.
2. culture is used to indicate that cognition, feelings, and behaviors are shared among a group of people in a consensual way.

3. culture implies that these shared beliefs, values, and styles of behavior are passed on to others, especially children, and that the socialization and education of new members of the culture help preserve consensus from one generation to the next.
4. a society's values, beliefs, and practices involve more than "mental" and "behavioral" process; culture appears in objects and in the physical environment. (p.3)

Cultural differences appear not only in the organization of society but also in the physical environment such as home design and house form, public buildings, and urban planning. For example, house form is not only the simple result of physical forces or any single casual factor, but also the consequence of a whole range of socio-cultural factors seen in their broadest terms (Rapoport, 1969). For Chinese culture, influenced by Taoism and Confucianism, "Nature" is termed as "tzu-jan", or 'self-thus' (Liu, 1962). Chinese people consider themselves as a part of nature, and then imitate nature in their immediate environment. As Liu (1962) stated "Man is advised to submerge his being in the infinite flux of things and to allow his life and death to become part of the eternal cycle of birth, growth, decline, death, and re-birth that goes on in Nature" (p.49).

In Western culture, the human is the major object in painting, while natural scenery is in the background. This emphasizes the anthropocentric concept of Western culture which derived from religion (McAndrew, 1993). In Western religion, "... humans are not just an ordinary part of nature -- they are made in God's image and are quite different from the rest of creation" (McAndrew, 1993, p.233). Those different philosophical notions may be the stimulus for the difference in people's attitudes toward nature. For example, Westerners seem to try to dominate nature, whereas Easterners (especially the Chinese) tend to protect a site rather than endanger it (Rossbach, 1983). The formal, geometric, and symmetrical patterns of landscape style were developed by Western culture, while the oriental landscape style is based on informal and asymmetric patterns (Yang, 1988). In Chinese landscape style, a rock means mountains (*yang*), which represents the male force; and water represents the sea (*yin*), which symbolizes the female force (Jellicoe & Jellicoe, 1987). From this point of view, Chinese people conceive of themselves as a part of the whole universe and try to embrace and be near nature in their home courtyards.

Physical environment can be divided into two dimensions: the natural environment and the built environment. The natural environment refers to the initial geographical features on earth, whereas the built environment refers to the human influenced environment. Since culture is composed of factors

such as the human-influenced part of the environment, culture and physical environment are closely interrelated. Through a psychological process, culture and physical environment can interact by way of mental and behavioral activities (Altman & Chemers, 1984). "Mental activities" refer to how people see, smell, hear, and interpret the physical environment along with their personal attitudes and beliefs toward the physical environment. "Behavioral activities" refer to what people do overtly in the physical environment.

The relationship between culture and environment is termed "culture-ecology" (Vayda, 1969; Berry, 1975). The concept of culture-ecology emphasizes the physical environment that plays a determinant role in customs, life-style, social values, and behaviors in different cultures (Altman & Chemers, 1984). Berry (1975) proposed two types of relationships between environment and culture. The "strong" version suggests the physical environment is the major factor influencing cultural processes. There is a significant one-way causal relationship between these two variables. In other words, the physical environment plays an important role in influencing cultural formation and development. In contrast, the "weak" version implies that there are "functional interdependencies" among environment and culture variables; and it is difficult to establish an obvious direction of the relationship or cause and effect (Figure 2-1).

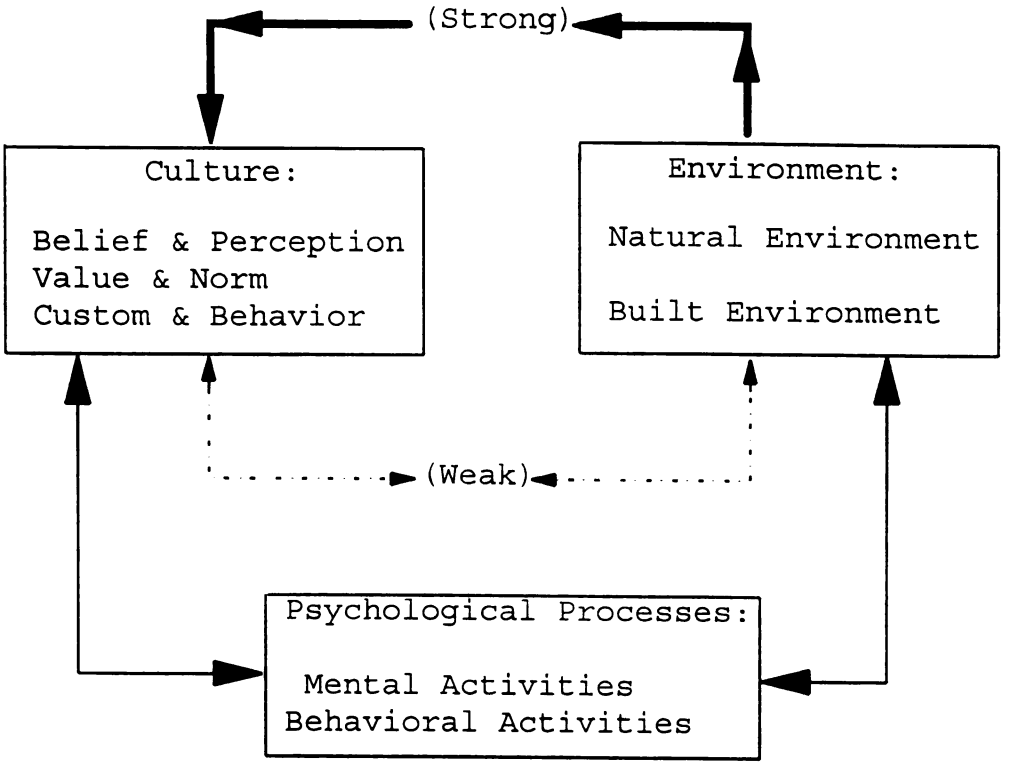

Figure 2-1 The culture/environment interaction

(Source: Berry, 1975, Altman & Chemers, 1984)

Landscape ecology, another point of view, stresses that the interaction between living and non-living elements already exists (Zonneveld, 1990). There is no specifically strong or weak relationship between culture and environment. Instead, it is combined with these relationships more comprehensively and called "landscape ecology". As Zonneveld (1990) stated:

> Landscape ecology in its wide sense is involved with cultural aspects as well. Landscape ecology is therefore functioning as a meeting place for many disciplines, a variety of natural sciences as well as humaniora. (p.12)

Despite the weak or strong relationship between culture and environment, Zube (1982) argued that there are three components of the human-environment interface. The human component includes past experience, knowledge, expectations, and the social-cultural contexts of individuals and groups. The second component, the environmental component, is dependent upon scale -- ranging from small scale to large elements of the physical environment. The third component is the results of the human-environment interaction. The interaction results as outcomes in turn affect both the human and environmental components. For example, both the pyramids of Egypt in ancient times and the highly developed metropolitan areas in modern society are interaction results which increase the self confidence of humans in nature and modify the characteristics of the environment.

As a matter of fact, no matter what the relationship is between humans and the environment, the major purpose of cultural and environmental studies is to try to understand what values humans attach to the environment and to document the role humans play in reflecting the environment. As Laurie (1975) stated:

> On the one hand, the environment has a definite impact on the individual, and our response may be adapted to the

> imposed conditions. On the other hand, we are continually manipulating or choosing our physical surroundings in an attempt to make life physically and psychologically more comfortable. (p.153)

Perception and Preference

Perception and preference are the psychological processes involved when humans judge an object. Perception is viewed as not only dealing with information from environment, but also yielding information about what people are concerned with (Kaplan, 1988). The process of recording perceived environmental information is done by internal processing of information such as coding, storing, recalling, and decoding the relative location and attributes of objects in the spatial environment (Figure 2-2). First of all, people obtain information from the real world by way of acquisition. In our mental activities process (internal), we code, store, recall, and decode this information to interpret its meaning to ourselves. As long as getting basic conceptions about the meaning of information, people will try to locate and attribute this information as the functional purpose to their surrounding environment.

Through environmental preference, humans not only deal with the outcomes that result from perceiving things and spaces, but also react to them in terms of their potential usefulness and supportiveness (Kaplan, 1988). It is referred

to as positive or negative personal evaluation, feelings, or attitudes toward the environment. The difference between perception and preference is that perception is only the sensing of an object or scene instead of preferring it or not. In other words, we need to perceive the object initially (perception) before we make the judgment as to whether we like it or not (preference).

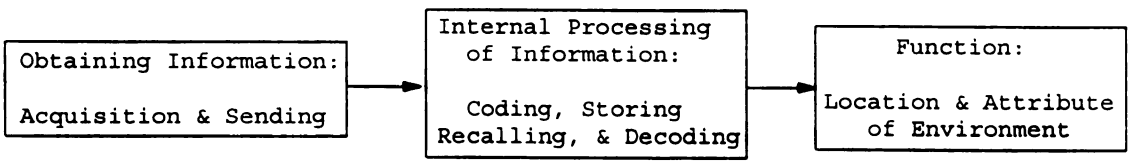

Figure 2-2 The process of perceiving the environment (Adapted from Altman & Chemers, 1984, p.45)

Landscape Preference Studies

Despite an abundance of literature concerning landscape preferences, only a few studies have dealt with the comparison of landscape preference between Western and non-Western groups (Nasar, 1984; Berlyne et al., 1974; and Yang & Kaplan, 1990). The purpose of cross-cultural comparisons is to provide further insights into the nature of environmental preference (Canter and Thorne, 1972; Nasar, 1988). Two major findings appeared in these landscape preference studies based on inter-cultural backgrounds.

The literature on cross-cultural comparison of preference for natural environments shows relatively high agreement when the backgrounds of cultures are relatively similar (Zube, 1984). For instance, Ulrich (1983) found consistent patterns between Swedes and Americans and argued that studies have shown that these two cultures have more similarities than discrepancies in the perception and evaluation of the environment. Zube and Mill (1976) reported high correlation coefficients between two Australian samples (seasonal and year-round residents) and American landscape architecture students in rating Australia landscapes. Zube and Pitt (1981) compared Yugoslavian students, Italian Americans, and various American groups and showed similar high correlation coefficients for scenes of northeastern American landscapes. Shafer and Tooby (1973) also reported consistent preferences in their comparison of Scottish and American samples. The report by Wheeler (1984) presenting a set of preference ratings of scenes by participants in various Western European countries as well as students from the University of Arizona also supports Zube's conclusions. Therefore, when the respondents' cultural backgrounds are similar, there is greater agreement in environmental preference.

By contrast, among relatively dissimilar cultural groups, the preferences are distinctly less similar (Herbert & Kaplan, 1987). When culture is diverse (e.g. with respect to life styles, social values, and economic indicators), and when the

landscape styles are strikingly contrasted, the differences in preference are greater. Sonnenfeld (1967) found strong differences in preference among native and non-native Arctic residents. Zube and Pitt (1981) reported a relatively lower correlation in scenic quality ratings between West Indians and American samples when they viewed scenes of the Virgin Islands. Yang & Kaplan (1990) found that Western tourists preferred Japanese styled landscape to their own, and Korean people preferred Western styled landscape to Korean styles of landscapes. Zube and his colleague (1985) found very significant differences in perceived urban residential quality when measuring the responses of Saudi Arabians and Americans.

Landscape preference studies in Taiwan are not as well-developed as in the U.S. There is a lack of developed professional and theoretical research methods in this field in Taiwan. Most landscape preference and evaluation studies have been completed by experts whose backgrounds are Urban Planning, Horticulture, Forestry, or Architecture. The assessment methods used were primarily based upon experts' judgment. Since landscape preference studies in Taiwan are just beginning, pervious findings from cross-cultural research in this field are still limited.

In a case study, Lin (1979) divided landscapes into two categories: inland landscapes and coastal landscapes. For the inland landscapes, three components were used to evaluate their quality; six factors were used to evaluate the coastal

landscapes. In addition to these criteria, landscape variety and homogeneity were also major factors used in evaluating the whole landscape. In the case study, he used a grid system to categorize the site into several areas. Using the rating scale which was adopted from Linton's method (1968), he evaluated the total scores for each grid to decide which area had the highest landscape value (Figure 2-3). He concluded that this evaluation system could be applicable in recreation planning and landscape evaluation.

In addition to the analysis of the physical environment, Lee (1983) added aesthetic attributes to the assessment of landscape preference. She proposed vividness, uniqueness, degree of naturalness, and unity as predictors to evaluate quality of aesthetics. Using a rating scale from 1 (worst) to 5 (best), she asked 224 subjects to rate 12 pictures that were taken in Pin-Lin village. She concluded that the combination of the elements of landscape space and the attributes of landscape aesthetics together made it possible to predict landscape preference by sampling the general population instead of particular groups.

Using the SBE (Scenic Beauty Estimation, Daniel & Bolster, 1976) assessment model, Zu (1989) measured landscape preference and paid more attention to climate factors. She proposed the hypothesis that different climate situations would produce different physical visual effects in the same scene. Using 90 color pictures, she asked 102 subjects to rate

表5－6　研究地區景觀資源之評估矩陣

評估準則 / 景觀空間單元	內陸景觀評估										海岸景觀評估										共同因子評估					景觀資源組成要素總評值	變化度評估				統一度評估			整體關係評估之總評值（註）
	地形景觀	土地使用景觀	面狀水域			線狀水域					點狀地形		海岸地形（礁岩海岸）			海岸地形（沙質海岸）			海岸特殊地形景觀				是否出現古蹟遺跡	是否出現管理性景觀	結構物		是否出現珍稀動植物		變化度評估				統一度評估			
			面積比例	水域數目	線狀指數	線狀指數	水色	有無油污	河流	線狀指數	有無河口	峽灣程度	顏色對比	高度對比	沙灘面積	沙灘顏色	岸邊植物	海蝕洞等	海中岩礁	瀑布				結構物景觀協調程度	結構物本身美觀程度			地形	植被	面狀水域	線狀水域	地形	植被	水域	
CL－1	6	3								1		2	2	2				1	2	2						21	B	B		B	B	B	B	B
CL－2	6	3								1		1		1				1	2						1	16	A	C		B	B	B	B	B
CL－3	5	4								1		2	1	2				2	2			1				20	A	C		A	B	A	A	A
CL－4	5	4				4						1		1									1			16	B	C		A	A	B	A	A
CL－5		4				2						3	2	2				2	2	2		1	1	1		22	B	C		A	A	B	A	A
CL－6	6	1				3													2	2			1			13	A	B		B	B	B	B	B
CL－7	6	5				3								1						2						17	B	A		A	B	A	A	A
CL－8		3				4						1	1	1				1	2	2	1		1			19	B	B		B	B	B	B	B
CL－9		3				2								1	1											9	C	B		B	C	C	B	C
CL－10		3				5								1					2				1			14	C	B		B	B	B	B	B
CL－11		3				4			1	2					1		1		1							16	C	B		B	B	C	B	C
CL－12		3				1									1		1		2		1					11	C	A		B	C	B	B	C
CL－13	5	1				2			2	4					2	2	1									20	C	B		A	A	B	A	A
CL－14	6	4				1								1												12	B	B		B	B	B	B	B
CL－15	6	4				1								1				2								14	B	C		B	B	B	B	B
CL－16	6	5				3								1					2				1			18	B	A		B	B	B	B	B
CL－17	6	4				2				2		2		2					2	2			1	1		22	B	B		A	B	B	B	B
CL－18	5	-2				1				1		1	1	1					2	2		1				12	A	C		A	A	B	A	A
CL－19	6	-2				3				3		1	1	1					2	2		1				13	B	B		B	B	B	A	B
IL－1	6	4																								10	B	B			B	C		B
IL－2	6	6																				2			1	13	A	C			A	B		A
IL－3	3	6																								9	B	B			A	A		B
IL－4	8	4																								12	B	B			B	A		B
IL－5	6	3																								9	B	B			B	B		B
IL－6	2	5																								7	B	A			C	B		B
IL－7	3	5																								8	B	B			B	B		B
IL－8		4				2			1																	7	B	B			B	B		B
IL－9	5	3																						1		7	C	A			B	C		C
IL－10		4				2			1																	7	B	B		C	C	B	B	C
IL－11		5				6			1																	12	C	B		B	C	B	B	C
IL－12	5	3				2		1	1																	12	B	B		A	B	A	B	A
IL－13	3	3																								7	A	B			B	B		B
IL－14	5	4																								9	B	B			B	B		B
IL－15	5	4				2		1	1																	13	A	B			B	B		B
IL－16	5	6																				2				13	B	A			B	C		B
IL－17	6	-2				2			1																	7	B	B		B	A	B	C	B
IL－18	2	4				2			1																	9	B	A			B	B		B

註：整體關係評估之總評值—A：變化度及統一度評估中均各有A最出現者
B：A，C兩種以外之其他分區，評定爲B級
C：變化度及統一度評估中均各有C最出現者

Figure 2-3 The matrix of landscape resources evaluation (Lin, 1979)

each stimulus from 1 (strongly dislike) to 9 (strongly like). She concluded that climate condition as a factor has a significant relationship with landscape preference. Furthermore, morning and evening landscapes were the most preferred. Pictures of landscapes on a rainy day were the least preferred.

Chu (1986) studied landscape preferences by comparing the difference between color pictures of a site and actual on-site experiences with the Semantic Differential scale. After concluding that there is no difference between these two types of stimuli, he used color pictures to measure the preference of cityscapes in Taipei. He found that the preference scores in commercial and industrial areas were the lowest, whereas governmental and cultural areas had the highest scores. The preference in residential areas varied depending on the degree of development in each sub-residential area.

Familiarity

It is reasonable to expect that people prefer the thing they know. They gain familiarity from many circumstances, such as where they live, work, visit, and the culture norms and beliefs they adhere to. Kaplan & Kaplan (1989) stated that familiarity is the major factor accounting for preference differences. Several other cross-cultural studies emphasized the importance of the relationship between preference and familiarity (Hammitt, 1979; Nasar, 1984; Sonnenfeld, 1966; and

Yang & Kaplan, 1990). Theoretically, individuals from another country would be less familiar with scenes taken in the USA. The expectation is that local preferences would be higher if familiarity had a positive influence, whereas preference would be low if familiarity had a negative influence. In fact, the influence of familiarity on preference has been demonstrated to be quite complex, rather than simply positive or negative (Kaplan & Kaplan, 1982). Past experience and prior knowledge of specific landscape types often are associated with the highest preference scores. It is also supposed that excessive familiarity may breed contempt, leading to reduced landscape preferences (Hammitt, 1981).

As mentioned above, in environmental preference studies, familiarity has been shown to be an important predictor. Sonnenfeld (1966) found that younger persons preferred exotic natural scenes, while most others preferred more familiar scenes. Hammitt (1979) suggested that the comparison of familiarity ratings with preference ratings for the same landscape showed a positive relationship. Yang & Kaplan (1990) concluded that familiarity served as a positive factor in predicting environmental preferences for both Western visitors and Korean respondents.

In contrast, Canter and Thorne (1972) found that residents of Scotland and Australia preferred unfamiliar to familiar urban scenes. Nasar (1984) reported that American and Japanese students prefer foreign scenes (less familiar) to

native ones. When rating scenes of the West Australian landscape, Herbert and Kaplan (1987) also reported increased preference for more novel settings and decreased preference for seemingly familiar settings among Western Australian and American students.

Models for Assessing Landscape Quality

Contemporary landscape assessment methods have been developed over many years. Each model is designed to deal with specific problems encountered in understanding the values of landscape quality. The purpose of landscape assessment is to provide sensitive and reliable measurements of scenic quality in different landscapes. According to Daniel & Vining's report (1983), landscape quality models can be divided into five major categories. They are (1) ecological, (2) formal aesthetic, (3) psychophysical, (4) psychological, and (5) phenomenological. Zube and his colleagues (1982) divided these landscape assessments into four paradigms: expert, psychophysical, cognitive, and experimental, where ecological and formal aesthetic categories are the same as the expert paradigm; and psychological categories are analogous to the cognitive paradigm. About 40% of landscape perception articles are in the expert paradigm (ecological and formal aesthetic), and 35% of landscape assessment reports are in the psychophysical paradigm (Zube et al., 1982).

Three criteria, which are reliability and sensitivity, validity, and utility, were proposed by Daniel and Vining (1983) to evaluate these models. According to these criteria and the valuation of each model, they concluded that psychophysical and psychological models are the most reliable

and valid means of evaluating landscape quality (Table 3-1).

Table 3-1

The Evaluation of Landscape Assessment Models[a]

	Ecological	Formal Aesthetic	Psychophysical	Psychological	Phenomenological
Reliability & Sensitivity	No direct evidence to proof its reliability and sensitivity	High reliability between experts. Low sensitivity due to the categorization	High reliability and sensitivity	High reliability & sensitivity in single dimension	Low reliability, but high sensitivity
Validity	Difficult or impossible to perform	Question: Does the set of formal elements capture all of the aesthetic aspects of the landscape	High validity	High validity	More valid in conceptualization for landscape-quality assessment than in the role of objective landscape features assessment
Utility	Depends on whether the development will destroy critical wildlife environment or not. If yes, it is useful. If not, the utility is still untested	Widely in use: Forest Service, Bureau of Land Management, and a number of private and semipublic agencies	In the short run, it is not efficient due to considerable time and expense. In the long run, it is very efficient	Depends on how well the principle of psychological dimensions can be tied to physical features of the landscape; and to related aspects of realistic human responses to the landscape	Too sensitive to be useful
Valuation	Natural ecosystem is viewed as having intrinsic value which separates it from any reference to other social values or human welfare	Can not be applied in moderate or large-scale studies. Not easy to relate these assessments to economic or social values	Provides precise assessment of public perception related to scenic beauty of landscape; and can be measured as a guide to economic cost	Provides direct measures of human/social value and relates landscape quality to human health and productivity	Fails to establish systematic relationship between psychological responses and landscape features; only points out the importance of the human context in which landscapes are encountered

Note: a: Source: Daniel & Vining, 1983

In the psychophysical model, a mathematical strategy is used to assess the relationships between geographical characteristics of landscape and the perceptual judgment of observers. The SBE (Scenic Beauty Estimation, Daniel & Bolster, 1976) model is representative of this model. This model measures humans' psychological responses specifically from a single dimension of environment such as scenic beauty or landscape preference.

The basic assumption in a psychological model is that people's cognitive and affective reactions are evoked by various pieces of landscape information. As Daniel & Vining (1983) stated "Relationships between the perceptual, cognitive, and affective scales and the preference scale are used as a basis for inferences and hypotheses regarding the psychological features of the landscape that determine human landscape preferences" (p.66). Kaplan and Kaplan and their associates (1989) have completed a series of studies in landscape assessment based on this model. They provide four constructs: mystery, coherence, legibility, and complexity as correlates of landscape preference.

In summary, in these landscape assessment models, ecological and formal aesthetic models deal with the interaction between humans and the environment from a physical perspective. Psychophysical and psychological models consider both physical and psychological attributes together. The phenomenological model concentrates on the detailed

psychological process of how people feel in the environment.

People's environmental perception and preference can be processed by way of both physical and psychological perspectives. According to Gibson's work (1979), the physical attributes firstly concern the environmental structures such as the medium, substance, and surface which compose the environment. The medium, such as air and sound, transmits light and vibration from object to object. Substance is a symbol of solid and rigid materials, while surface is the part of substance people can observe. What we can notice is the information available from the interface of substance and medium: the surface. Secondly, the meaning of environmental structure from these physical properties becomes a geographical layout, an event, and the affordance to humans that is derived from the environment. The layout is considered the persisting arrangement of surfaces relative to one another. The event is referred to as any change in an object, place, of surface such as reshaping or repositioning of surfaces; or change in color or texture. Affordances are what the environment can offer to humans and animals in terms of their potential action or use. As Gibson (1979) stated :

> To perceive is to be aware of the surfaces of the environment and of oneself in it. The interchanging between hidden and unhidden surface is essential to this awareness. These are exiting surfaces; they are specified at some points of observation. Perceiving gets wider and

> finer and longer and richer and fuller as the observer explores the environment. The full awareness of surfaces includes their layout, their substances, their events, their affordances. Note how this definition includes with perception a part of memory, expectation, knowledge, and meaning -- some part but not all of those mental processes in each case. (p.255)

Psychological attributes involve personal traits: norms, values, and beliefs. People obtain information from the external (physical) environment and generate that information by using an internal psychological process (coding, storing, and recalling) to understand the meaning of environment. After perceiving the meaning of environment, people judge this combined information according to their past experience (such as familiarity), and by way of the associated variables that influence preference to decide whether they like it or not (see Figure 3-1).

As mentioned before, the main purpose is to compare the landscape preferences of individuals from different cultures. Although the preference predictor could provide certain knowledge by which to understand the cultural differences in landscape preference, not every predictor functions as well as researchers expect. According to the Kaplans (1989), only the mystery variable was consistency found to be correlated with preference (Table 3-2). Besides, Yang (1988) also failed to

test the validity of these predictors in his cross-cultural study of landscape preference. More specific definition of these variables and better-designed methods are necessary to evaluate the reliability and validity of these predictors.

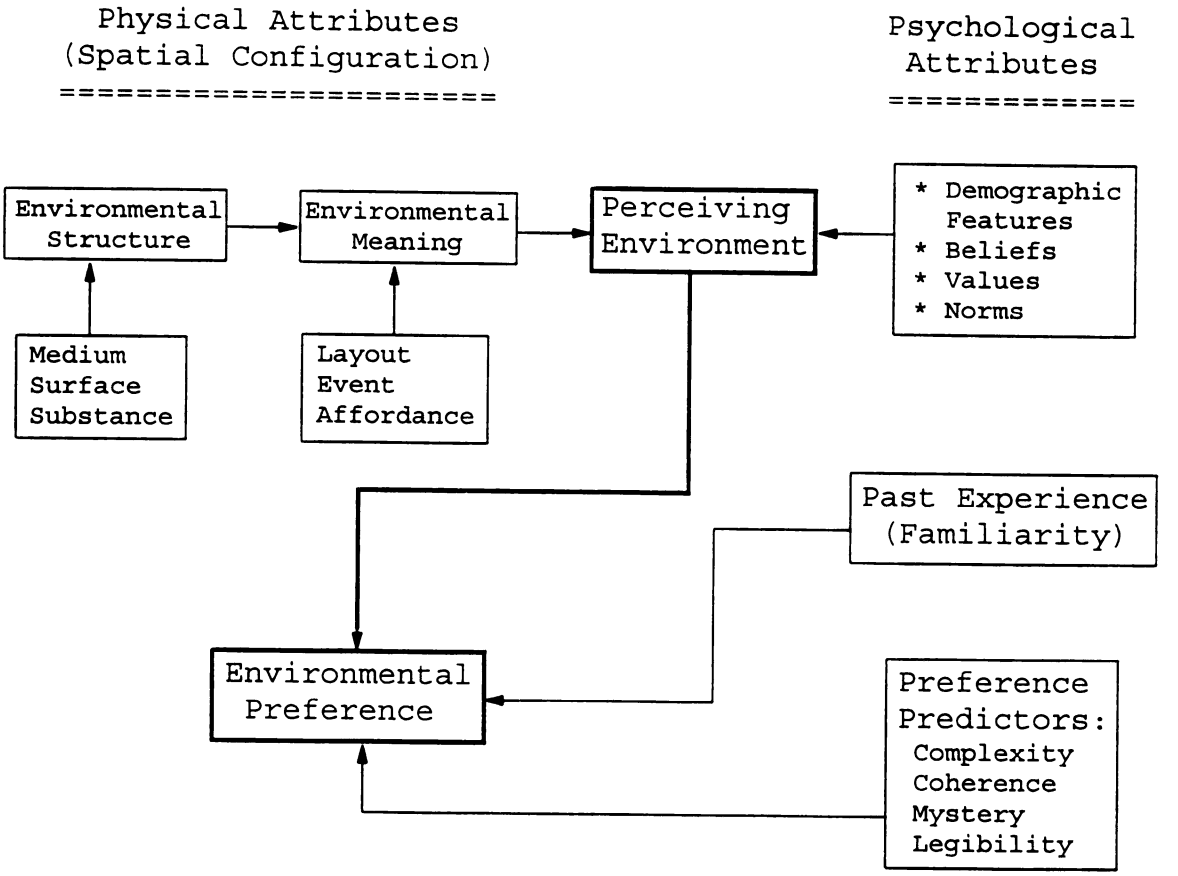

Figure 3-1 The process of environmental perception and resultant preference (Sources: Gibson, 1979; Taylor et al., 1987; Palmer, 1986; Altman & Chemers, 1984; and Kaplan & Kaplan, 1989)

Table 3-2

Comparison of Results of Regression Analysis Using Informational Factors in Preference Matrix[a]

Study	# Scenes	R^2	F	p	Complex. (partial	Coher. correlation	Mys. coefficient)	Legib.
Woodcock	72	.19	8.28	.001	xx[b]	xx	.38	--[c]
R.Kaplan et al.	59	.19	3.11	.05	--	--	.31	--
Ellsworth	60	.24	4.35	.005	--	--	.31	--
Herzog, 1987	70	.50	10.64	.001	--	--	.39	xx
Gallagher	32	.42	6.75	.001	--	.51	--	xx
Herzog et al.	70	.13	3.25	.05	--	.26	34	xx
Herzog, 1985	70	.46	9.11	.001	--	.39	.34	xx
Herzog, 1985	70	.87	43.70	.001	--	.60	.45	--
Anderson	48	.45	8.92	.001	--	.53	.49	-.43
Herzog, 1984	100	.53	17.42	.001	.33	.21	.33	xx
Replication	56	.49	16.76	.001	-.39	.33	.56	xx

Note: a: Kaplan & Kaplan, 1989, p.65
b: Not included in study; c: Not a significant factor
Complex.: Complexity Coher.: Coherent
Mys.: Mystery Legib.: Legibility

In this research, a psychophysical model is chosen to evaluate landscape preference differences. This method provides precise assessment of public perception related to scenic beauty of landscape that is the major component this study focuses on. Besides, the quantitative technique of this method is looking for the mathematical relationships between the physical characteristics of the landscape and the perceptual judgment of human observers. As Daniel (1990)

stated "the psychophysical methods provided a set of tried and tested procedures for translating human responses to environmental stimuli into precise and reliable indexes with known metric properties." (p.634) As mentioned earlier in Table 3-1, this method is highly reliable and valid based on past studies, and this offers another reason to choose this approach.

Study Sample

The populations used in this study were American and Taiwanese students. Subjects in America were chosen at Michigan State University by selecting students in an introductory recreation resources course in the Park & Recreation Resources Department, and students in a Landscape Architecture Department course. Subjects in Taiwan were selected from courses in the Landscape Department in Tunghai University; and in courses in the Horticulture Department in Taiwan University. The survey was conducted both in America and in Taiwan between July and October in 1992.

Experimental Stimuli

Using color or black-white photographs to evaluate landscape quality and preference has been shown to have a high degree of reliability and validity in landscape assessment studies (Kaplan & Kaplan, 1989). In this research, mountainscapes, waterscapes and humanscapes were selected as

stimuli to measure subjects' preference, familiarity, and their opinion about acceptable levels of human development in natural settings.

In many religions and cultures, mountains play a very important role as symbols of the power and dominance within nature. In Chinese, Korean, Iranian, Asian Indian, and German cultures, mountains are a central axis of the earth and serve as a link with heaven (Altman & Chemers, 1984). Thus, the feeling toward mountains is both negative and positive. In Western cultures, the positive attitudes toward mountains were not distinct until the 19th century, because of the development of transportation (Tuan, 1974). The evolution of transportation vehicles made it more convenient for people to be near or in the mountains to discover the mysterious aspects of mountains. The terms that describe mountains range from "powerful", "respectful", and "sacred" to "spectacular", "exquisite", and "the essence of natural beauty".

Waterscapes, such as oceans, lakes, rivers, and waterfalls, are seen positively by many cultures. Many cultures developed and were shaped by their proximity to water locations. Water provides transportation, food, security, and climate moderation. Many studies have reported that water is one of the major factors influencing landscape preferences (Palmer, 1986; Zube et al., 1975; and Yang, 1988). Most of these studies were conducted to evaluate the landscape preference of respondents from Western cultures. While

comparing landscape preferences of Westerners and Koreans, Yang (1988) found that water in a landscape scene could strongly enhance landscape preference for both sample groups.

Since there is a strong relationship between environment and culture, human influences on the natural environment could differ, depending upon the characteristics of the culture. The objective of studying human influences in natural environment has been excluded from landscape preference studies (Vining et al., 1984). In addition to understanding preferences across natural landscapes, assessing opinions of acceptable levels of development in a natural area is another major objective of this study. One group of slides presents different degrees of development and is used to address this objective.

Thirty four landscape slides were used as stimuli which were taken in America and in Taiwan. These slides were placed into three types of landscape: mountainscapes, waterscapes, and humanscapes. These categories and categorizations, devised by the experimenter, were reviewed by the experiementer's thesis committee.

In addition to measuring these three types of landscapes, several detailed geographical features were presented to help in understanding the preference for physical characteristics among different cultural groups (Appendix A). The numbers of slides for each landscape type are shown in Table 3-3. These detailed features are described as followed:

Table 3-3

Stimuli Types and Slides

Landscape Type	Slide #	
Mountainscape (M)		15
Superior (M1)	5	
Normal (M2)	5	
Inferior (M3)	5	
Waterscape (W)		9
Distance dimension (W1)	6[a]	
Near category (less than 10 feet, W1)	3	
Far category (more than one mile, W2)	3	
Combined landscape (W3)	3	
Water condition	6[a]	
Moving water (W4)	4	
Still water (W5)	2	
Humanscape (HD)		10[b]
Human habitation (HD1)	4	
Road construction (HD2)	2	
Trail development level (HD3)	4	
Acceptable level of environmental development (HDL)	10	
Total		34

Note: a: The contents of slides in distance dimension were reused in water condition dimensions.
b: The same ten slides were reused to assess opinions of acceptable levels of environmental development.

* Mountainscape --

The criteria of position of viewer (superior, normal, and inferior) are assessed in this type of landscape. There are five slides to represent each of these three mountainscape dimensions.

1. Superior (M1) 2. Normal (M2) 3. Inferior (M3)

* Waterscape --

Four dimensions vary in this set of landscape slides.

1. Distance dimension between viewer and water varies in the slides from near (W1) to far away (W2): Three slides representing the "near" category have distances between water and viewer of less than ten feet. The other three slides indicating distance between water and viewer of more than one mile represent the "far" category.
2. Combined landscape with mountain & water (W3): Three slides are included in this dimension.
3. Water situation [moving (W4) & still (W5)]: Four slides are included in moving water sub-dimension, while two slides are represented in the still water sub-dimension. These six slides in this dimension are the same as in the distance dimension.

* Humanscape --

Three dimensions are represented in this type of landscape.

1. Human habitation -- buildings (low developed to highly developed; HD1): Four slides are in this dimension in which each slide represents one level of human habitation: a single cabin, a single temple, a small village, and an over-developed community.
2. Road construction (well-paved or rough; HD2): Two slides are in this dimension, of which one is well-paved and the other one presents rough road conditions.

3. Development level of trail (low to high; HD3): Four slides are in this dimension. Each slide represents one single level of trail development: a trail along the mountain, a small scale hiking trail, a highly-developed route, and an over-developed route.
4. Opinions of acceptable level of environmental development (HDL): In the humanscape condition, subjects' opinions regarding environmental development issues are compared.

All slides in the humanscape dimension will be used in the measurement. In the waterscape condition, six slides used in the distance dimension are re-used in the moving and still water conditions in order to measure another physical attribute. The order of slides is mixed in each landscape type. For example, the 15 slides of mountainscape were randomly mixed together with other slides.

Procedures

A slide projector was used in a classroom to show the stimuli. Slides were taken with a 35mm standard lens basing normal visual angles. Using a Likert type scale, students were asked to complete a questionnaire asking questions about their preferences for specific slides along with demographic background information. An English questionnaire was used in America, while a translated Chinese questionnaire was used in Taiwan (Appendix B).

Slides were shown to students in a classroom setting. First, the investigator explained the purpose of the study and described the rating scales to be used. Second, all slides were shown briefly to let the subjects have a general idea and understanding of the order of the stimuli to be presented. Third, each slide was presented again for 10 to 20 seconds, the exact display time per slide varied slightly; each exposure was judged by experimenter to give enough time for subjects to evaluate the slide and respond. In the third section, for slides in the humanscape condition, a rating of the level of acceptable development was processed in addition to preference and familiarity ratings. Finally, in the last section of the instrument, students were asked questions concerning their personal background.

Statistical Analysis

In this study, the dependent variables are preference (P), familiarity (F), and opinions on levels of environmental development (L). The independent variables of interest are mountainscape (M), waterscape (W), humanscape (HD), and several demographic variables such as nationality and residency.

Correlation and regression tests were used to determine which independent variables are associated with the dependent variables. Dummy variables were used in the analysis because some demographic variables were nominal variables. For

example, Taiwanese were coded as 0, while Americans were coded as 1. Using this coding procedure, confusion about the correlation and regression outputs could be avoided.

To understand the differences between Taiwanese and American subgroups, t-tests were employed to compare landscape preference, familiarity, and opinions regarding levels of environmental development for the three types of landscapes: mountainscape, waterscape, and humanscape. Comparisons of dimensions within each landscape type were tested with t-tests as well.

ANALYSIS AND FINDINGS

Sample Profiles

There were 189 American subjects and 287 Taiwanese subjects in this study. The total sample size was 476 subjects. Because this survey was conducted in the classroom, and in the presence of the instructor and experimenter, the response rate was very high. Occasionally, some questions were omitted, but no case was found totally invalid in this survey. The frequency distribution by subgroups is shown in Table 4-1.

The gender distribution is evenly divided between men and women for both the American and Taiwanese samples. Most of the American subjects lived in suburban areas (62%) whereas half of the Taiwanese subjects lived in urban areas (50%). This finding could be explained by the fact that Taiwan is a small island where many places have already been developed as urban areas, whereas students in MSU are more likely to come from small towns or rural areas. The age range for each group was primarily from 19 to 22 years old. Many Taiwanese did not have any out-of-country travel experience (71%), whereas fifty nine percentages of the American subjects had visited one or two countries at least. Most of the Taiwanese subjects who never traveled to other countries were male. This is due to the national military service policy in Taiwan. This policy prohibits males from going out of the country if they have not completed military service. The majority of each group were

seniors and juniors in college.

Table 4-1

Profile of Each Subgroup

Characteristic	American(1)		Taiwanese(0)		Total	
	#	%	#	%	#	%
Gender						
Male	97	51	164	57	261	55
Female	92	49	123	43	215	45
Residence						
Urban	24	13	143	50	167	35
Suburban	117	62	91	34	208	44
Rural	48	25	53	16	101	21
Academic Major						
LA background	77	41	170	59	247	52
Non-LA background	112	59	117	41	229	48
Academic Status						
Senior	129	68	95	33	223	47
Junior	46	24	85	30	131	28
Sophomore	9	5	49	17	58	12
Freshman	5	3	58	20	63	13
Age						
19(or below)	14	7	43	15	57	12
20	22	12	59	21	81	17
21	65	34	61	21	126	26
22	45	24	52	18	97	20
23	8	4	24	8	32	7
24	5	3	15	5	20	5
25	4	2	17	6	21	5
26(or above)	22	12	16	6	38	8
Travel Experience						
0	23	12	203	71	226	47
1	65	34	29	10	94	20
2	48	25	23	8	71	15
3	13	7	5	2	18	4
4	6	3	7	2	13	3
5	5	3	7	2	12	3
6	5	3	6	2	11	2
7(or more)	24	13	7	3	31	7

With regard to travel experience, Americans have a different travel pattern from that of Taiwanese students. In this survey, the American subjects had traveled to 45 countries and the Taiwanese to 30 (Table 4-2). The countries Americans traveled to most were Canada (148, 89%) and Mexico (61, 38%). The others are France (30), England (30), Germany (29), and Australia (24). All of these countries except Australia were in North America or in Europe. Only a few people had been to Asia or the Mid-Eastern countries. Fourteen of 15 American students who were landscape architecture students had been to Czechoslovakia. This is because there is a special travel course for students who major in Landscape Architecture; they have the opportunity to visit Czechoslovakia. Of the Taiwanese, only 84 (29%) subjects had travel experiences. Of these, the nationalities and number of trips taken are indicated as follows: Japan (51), Hong-Kong (25), Singapore (12), U.S.A. (21), Thailand (16), Korea (14), and China (11). Except for the U.S., countries visited are in Asia, destinations located near Taiwan and sharing the same cultural background. European countries are the second most popular destination for Taiwanese. France, England, Switzerland, and Holland are the most common European destinations for Taiwanese. Overall, European countries such as France, Germany, England, and Switzerland were the most popular European destinations for both groups, while Japan is the only one in the Asia region preferred by all subjects.

Table 4-2

Countries Visited by American and Taiwanese Students

Country Name	American	Taiwanese	Total
Canada	148	1	149
Mexico	61	1	62
U.S.A.		21	21
England (Great Britain)	30	6	36
France	30	9	39
Germany	29	5	34
Australia	24	5	29
Switzerland	18	6	24
Czechoslovakia	15		15
Italy	12	2	14
Spain	7		7
Ireland	6		6
Scotland	6		6
Greece	6		6
Belgium	6	4	10
Bahamas	6		6
Holland	7	8	15
Denmark	4	1	5
Norway	3	1	4
Sweden	3	1	4
Puerto Rico	3		3
Poland	3		3
New Zealand	2	1	3
Fiji	2		2
Israel	1		1
Egypt	1		1
Luxembourg	1		1
Trinidad	1		1
Russia	1		1
Finland	1	1	2
Guatemala	1		1
Barbados	1		1
Turkey	1		1
Portugal	1		1
Tahiti	1		1

Table 4-2 continued

Country Name	American	Taiwanese	Total
Jamaica	1		1
Venezuela	1		1
Japan	7	51	58
Hong-Kong	2	25	27
Thailand	1	16	17
Singapore	2	12	14
Korea	3	14	17
China	1	11	12
Taiwan	1		1
Philippines	1	6	7
Loochoo		5	5
Indonesia		4	4
Malaysia		5	5
Nepal		1	1
Cashmere		1	1
India		1	1
Macao		1	1

General Findings

Landscape preferences between American and Taiwanese students differed for mountainscapes and waterscapes ($t_{P1}(463)=-2.90$, $t_{P2}(474)=-5.16$, $p<.01$; Table 4-3). In the case of humanscapes, the preference scores were the same for both groups. Waterscapes had the highest preference score among the three types of landscape, whereas humanscape had the lowest score for both groups. American subjects preferred mountainscape and waterscape more than did the Taiwanese ($p<0.01$).

Table 4-3

Mean Scores of Preference, Familiarity, and Acceptable Levels of Environmental Development

		Stimuli						
Subjects		P1**	F1**	P2**	F2**	P3	F3**	HDL**
Taiwanese	M	3.23	2.89	3.93	2.84	2.52	3.28	2.74
	Sd	0.56	0.71	0.51	0.68	0.50	0.71	0.46
American	M	3.40	2.42	4.19	3.06	2.52	2.50	3.02
	Sd	0.58	0.86	0.59	0.83	0.73	0.81	0.60

Note: P1:Preference for Mountainscape F1:Familiarity with Mountainscape
P2:Preference for Waterscape F2:Familiarity with Waterscape
P3:Preference for Humanscape F3:Familiarity with Humanscape
HDL: Acceptable Level of Environmental Development
Mountainscape:15 slides; Waterscape:9 slides; Humanscape:10 slides;
Using t-test, * p<.05, ** p<.01

Familiarity ratings for all three types of landscapes between these two sample subgroups were significantly different [$t_{F1}(461)=6.95$, $t_{F2}(474)=-3.23$, $t_{F3}(469)=11.08$, $p<.01$]. Taiwanese were more familiar with the mountainscapes and humanscapes presented than were American students, while Americans reported higher familiarity with waterscapes than the Taiwanese.

In addition, the opinions of acceptable level of environmental development between these two cultural groups were significantly different [$t_{HDL}(468)=-5.75$, $p<.01$]. Taiwanese agreed less with the levels of human development

observed in the natural environment as shown in the landscape slides compared to Americans.

The mean scores of preference, familiarity, and opinion of acceptable level of environmental development for the three types of landscape by slide for each nationality are shown in Appendix C. Also, Appendix D illustrates the findings of this study in geographic format.

Slide Selection

The origin of the slides and the distribution of the slides influenced the degree of familiarity in the three types of landscapes. Eighty percent of the slides in mountainscape and 100% of the humanscape slides were taken in Taiwan, while 89% of the waterscape slides were taken in America. Because of this distribution, the degree of familiarity with each landscape type was obviously influenced (Table 4-4).

Table 4-4

Origin of The Landscape Settings for The Landscape Conditions

Setting	Landscape Condition					
	Mountainscape		Waterscape		Humanscape	
	#	%	#	%	#	%
Taiwan	12	80	1	11	10	100
American	3	20	8	89	0	0

As seen in Table 4-5, the Taiwanese were more familiar with landscape slides which were taken in Taiwan [t(317.50)= 10.29, p<.01], whereas Americans were more familiar with landscape slides that were taken in America [t(321.66)=-2.54, p<.05]. Besides, the American subjects liked landscape slides taken in America more than did the Taiwanese [t(365.51)=-4.32, p<.01].

Table 4-5

Preference and Familiarity Across Different Landscape Settings

Setting	Taiwanese		American	
	M	Sd	M	Sd
Landscape in Taiwan[a]				
Preference	2.86	0.48	2.97	0.66
Familiarity**	3.08	0.59	2.40	0.75
Landscape in American[b]				
Preference**	3.92	0.49	4.14	0.55
Familiarity*	2.82	0.61	2.99	0.80

Note: a: 23 slides were taken in Taiwan
b: 11 slides were taken in American
Using t-test, * p<.05, ** p<.01

According to these statistical analyses, the hypotheses of differences between the two cultural groups in landscape preference were supported in mountainscape and waterscape. Cross-cultural differences were observed as well in respondents' opinions of acceptable levels of environmental

development in humanscape slides. Based on slide origin, the degree of familiarity with each type of landscape was significantly related to these two cultural groups.

Correlation and Regression

The correlation matrix in Table 4-6 illustrates the relationships between the dependent variables (preference, familiarity, and acceptable levels of environmental development) and the independent variables. The relationship between preference and familiarity was significant and positive ($r_{P1\&F1}$=.22, $r_{P2\&F2}$=.19, $r_{P3\&F3}$=.25; p<.01). This indicated that as the degree of familiarity with landscape increased, preferences increased as well. Travel experience had a significant correlation with familiarity in two landscape types (mountainscape and waterscape) (r_{F1}=.11, r_{F2}=.22, p<.01). Those with more travel experience were more familiar with these landscapes. Residence had a significant and positive relationship with preference scores (r_{P1}=.19, r_{P2}=.22, r_{P3}=.14, p<.01). Those who lived in rural areas had higher preference scores for these landscape settings than people who lived in urban areas. With regard to acceptable levels of environmental development (HDL), nationality (r=.27, p<.01), residence (r=.14, p<.01) academic major (major in Landscape Architecture or other, r=.13, p<.01), and travel experience (r=.11, p<.01) revealed positive correlations with this variable. In addition, acceptable levels of environmental development also

Table 4-6

Correlation Matrix

	GENDER	NATIONALITY	AGE	RESIDENCE	ACADEMIC STATUS	ACADEMIC MAJOR	TRAVEL EXPERIENCE	P1	P2	P3	F1	F2	F3	HDL
GENDER		-.04	.03	.04	.11a	-.16b	-.18b	.06	.09	.1a	-.06	.05	.01	-.03
NATIONALITY	-.04		.08	.28b	-.39b	.19b	.36b	.13b	.22b	.01	-.31b	.15b	-.45b	.27b
AGE	.03	.08		.06	-.59b	-.28b	.16b	.06	.07	.00	.05	.12a	.07	-.02
RESIDENCE	.04	.28b	.06		-.21b	-.11a	.02	.19b	.22b	.14b	-.05	.13b	-.04	.14b
ACADEMIC STATUS	.11a	-.39b	-.59b	-.21b		.23b	-.22b	-.05	-.08	.06	.04	-.07	.13b	-.06
ACADEMIC MAJOR	-.16b	.19b	-.28b	-.11a	.23b		.03	-.04	-.09	-.03	.02	.01	-.09a	.12b
TRAVEL EXPERIENCE	-.18b	.36b	.16b	.02	-.22b	.03		.09a	.07	.08	.11a	.22b	.00	.11a
P1	.06	.13b	.06	.19b	-.05	-.04	.09a		.63b	.55b	.22b	.20b	.16b	.27b
P2	.09	.22b	.07	.22b	-.08	-.09	.07	.63b		.42b	.00	.19b	.07	.25b
P3	.1a	.01	.00	.14b	.06	-.03	.08	.55b	.42b		.19b	.22b	.25b	.44b
F1	-.06	-.31b	.05	-.05	.04	.02	.11a	.22b	.00	.19b		.51b	.64b	.00
F2	.05	.15b	.12a	.13b	-.07	.01	.22b	.20b	.19b	.22b	.51b		.43b	.13b
F3	.01	-.45b	.07	-.04	.13b	-.09a	.00	.16b	.07	.25b	.64b	.43b		-.01
HDL	-.03	.27b	-.02	.14b	-.06	.12b	.11a	.27b	.25b	.44b	.00	.13b	-.01	

Note: P1: Preference of Mountainscapes P2: Preference of Waterscapes P3: Preference of Humanscapes
F1: Familiarity with Mountainscapes F2: Familiarity with Waterscapes F3: Familiarity with Humanscapes
HDL: Opinion of Acceptable Level of Environmental Development; a: $p<0.05$; b: $p<0.01$

had a significant and positive relationship with preference scores for humanscape slides ($r=.44$, $p<.01$). It is inferred that the more one preferred the humanscape slides, the more agreement one reported for the observed levels of environmental development.

Another statistical test, regression, was employed to find out which independent variables were significantly related to preference, familiarity, and acceptable levels of environmental development. As can be seen in the Table 4-7, nationality was found to be a useful variable in the prediction of preference as was familiarity for each landscape type except familiarity with waterscapes (F2) ($B_{P1}=.23$, $B_{P2}=.22$, $B_{P3}=.20$, $B_{F1}=-.62$, $B_{F3}=-.96$, $p<.05$). Residence was another variable related to preferences and familiarity (except familiarity with mountainscape) ($B_{P1}= .13$, $B_{P2}=.09$, $B_{P3}=.10$, $B_{F2}=.19$, $B_{F3}=.10$, $p<.05$). Familiarity was confirmed to be significantly and positively related to preferences in this regression analysis ($B_{P1\&F1}=.23$, $B_{P2\&F2}=.11$, $B_{P3\&F3}=.24$, $p<.05$). Only nationality was a significant predictor for acceptable levels of environmental development (HDL) ($B_{HDL}=.29$, $p<.05$). Combining the correlation and regression statistical results, it was confirmed that familiarity had a positive and significant relationship with landscape preference. It was also concluded that nationality and residence not only had significant correlations with preference, but also were good predictors of landscape preference within the regression

Table 4-7

Regression Output Table

	Stimuli						
Factor	P1	P2	P3	F1	F2	F3	HDL
Multiple R	.34	.33	.34	.40	.28	.50	.26
R^2	.11	.11	.12	.16	.08	.25	.07
Adjust R^2	.11	.11	.11	.15	.07	.25	.07
F	20.40	14.34	15.21	43.69	13.08	51.30	34.17
B value							
Gender	--	--	--	--	.14	--	--
Nationality	.23	.22	.20	-.62	--	-.96	.29
Age	--	--	--	--	--	--	--
Residence	.13	.09	.10	--	.19	.10	--
Academic Status	--	--	.06	--	--	--	--
Academic Major	--	-.12	--	--	--	--	--
Travel Experience	--	--	--	.10	.09	.09	--
F1	.24						
F2		.11					
F3			.24				

Note: A stepwise regression procedure was used.
-- not significant at $p<.05$

analysis. The travel variable contributed to the prediction equation only for familiarity. It indicated that the travel experience would not influence personal landscape preference but would influence the degree of familiarity with the landscape slides. In evaluating the acceptable level of environmental development observed in the slides, only nationality was a significant predictor. Although gender, academic status, and academic major had some association with preference and familiarity in selected types of landscape, these results could be attributed to their intercorrelation with personal attributes. Given the purposes in this study, to focus on cultural differences, only the independent variable, nationality, will be discussed in the detailed analysis to follow.

In summary, the two hypotheses in this study were tested and confirmed. When cultural backgrounds were different (Western vs. Eastern), landscape preferences differed in certain types of landscapes. Higher degrees of familiarity with specific landscapes are associated with stronger landscape preferences. In the following section, detailed physical components in each type of landscape slide will be examined and compared across the two groups.

Differences Across Landscape Types

Mountainscape

There were three dimensions under study within the mountainscape slides presented: superior, normal, and inferior positioning of the viewer (Appendix A). Each dimension was presented in five landscape slides. As seen in Table 4-8, American students preferred slides representing superior and normal observation positions more than Taiwanese students did [$t_{M1P}(467)=-4.06$, $t_{M2P}(470)=-3.09$, $p<.01$]. There is no difference in landscape preferences for the inferior viewing position. Due to the fact that most of slides in this type of landscape were taken in Taiwan, Taiwanese students were more familiar with these landscape slides compared to Americans [$t_{M1F}(465)=9.55$, $t_{M2F}(470)=4.53$, $t_{M3F}(465)= 4.89$, $p<.01$].

Table 4-8

The Mean Score of Preference for and Familiarity with Mountainscape

		Stimuli					
Subject		M1P**	M1F**	M2P**	M2F**	M3P	M3F**
Taiwanese	M	3.12	3.08	3.33	2.87	3.25	2.73
	Sd	0.69	0.73	0.67	0.67	0.59	0.61
American	M	3.40	2.34	3.54	2.54	3.29	2.40
	Sd	0.83	0.92	0.78	0.93	0.75	0.88

Note: M1: Superior position; M2: Normal position; M3: Inferior position
P: Preference F: Familiarity; 5 slides in each position
Using t-test, * p<.05, ** p<.01

The normal viewing position had the highest preference score for both groups. The preference sequence from most preferred to least preferred for Taiwanese was normal position, inferior position, and then superior position [$t_{M1P\&M2P}(282)=-6.37$, $t_{M1P\&M3P}(283)=-4.01$, $p<.01$; and $t_{M2P\&M3P}(283)=2.57$, $P<.05$]. For American students, the order of preference was from normal position, superior position, and then inferior position [$t_{M1P\&M2P}(183)=-3.11$, $t_{M1P\&M3P}(181)=2.88$, and $t_{M2P\&M3P}(182)=5.7$, $P<.01$].

Waterscape

Three geographic criteria were proposed in this type of landscape: distance between viewer and water (near or far away), the landscape which combined mountain and water elements, and water condition (moving or still) (Appendix A). As seen in Table 4-9, Americans reported higher preference scores in the near distance range, the far away distance range, the combined landscape, and the moving water dimension [$t_{W1P}(474)=-5.44$, $t_{W2P}(474)=-3.21$, $t_{W3P}(474)=-3.92$, $t_{W4P}(474)=-6.26$, $p<.01$]. Landscape slides with combined mountain and water scenes had the highest scores for both groups. No matter which distance range was varied (W1 or W2), Americans had higher preference scores than did Taiwanese ($p<.01$). In addition, all subjects preferred the near distance range over the far away distance range [$t_{W1P\&W2P}$ $(286)=6.66$, $p<.01$ for Taiwanese; $t_{W1P\&W2P}$ $(188)=8.17$, $p<.01$ for Americans).

Table 4-9

The Mean Score of Preference for and Familiarity with Waterscape

	Stimuli									
Subject	W1P**	W1F**	W2P**	W2F	W3P**	W3F*	W4P**	W4F	W5P	W5F**
Taiwanese										
M	3.81	3.21	3.56	2.82	4.42	2.48	3.55	3.11	3.96	2.82
Sd	0.65	0.87	0.71	0.74	0.58	0.92	0.66	0.75	0.72	0.89
American										
M	4.16	3.59	3.78	2.87	4.63	2.73	3.96	3.08	4.00	3.53
Sd	0.74	0.94	0.76	0.90	0.61	1.17	0.75	0.84	0.72	0.97

Note: W1: Near range of distance (less than 10 feet, 3 slides)
W2: Far away range of distance (more than 1 mile, 3 slides)
W3: Combined landscape (3 slides)
W4: Moving water (4 slides) W5: Still water (2 slides)
P: Preference F: Familiarity; Using t-test, * $p<.05$, ** $p<.01$

In water condition (moving or still), Americans liked moving water conditions better than the Taiwanese ($p<.01$). The Taiwanese had higher preference scores for still conditions than moving conditions [$t(286)=-10.57$, $p<.01$], while there was not much difference in preference scores for the American group. Because eighty percent of landscape slides in waterscape were taken in America, Americans reported higher familiarity scores than did Taiwanese, except for the far away distance range and still water dimension [$t_{W1F}(474)=-4.47$, $t_{W5F}(474)=-8.15$, $p<.01$; $t_{W3F}(474)=-2.59$, $p<.05$]. This could be due to the fact that there was one landscape slide taken in Taiwan in both far away distance range and still water dimensions.

Humanscape

Three criteria were compared in this category: degree of human habitation in the natural environment, condition of road construction, and level of trail development (Appendix A). There were significant differences in preference scores between the two groups for human habitation and the road construction dimensions [$t_{HD1P}(471)=3.08$, $t_{HD2P}(474)=-5.66$, $p<.01$; Table 4-10]. For the human habitation dimension, Americans indicated a stronger dislike for human influenced construction in the natural environment compared to the Taiwanese students ($p<.01$). Taiwanese disliked landscape slides that showed road construction, while Americans had a higher preference score for this dimension ($p<.01$).

Table 4-10

The Mean Score of Preference, Familiarity, and Acceptable Development Levels in Humanscape

		Stimuli								
Subject		HD1P**	HD1F**	HD1L	HD2P**	HD2F**	HD2L**	HD3P	HD3F**	HDL3**
Taiwanese	M	2.59	3.22	2.75	2.70	3.64	2.92	2.36	3.17	2.66
	Sd	0.57	0.74	0.53	0.72	0.83	0.83	0.60	0.80	0.61
American	M	2.39	2.38	2.82	3.11	3.27	3.46	2.34	2.24	3.01
	Sd	0.81	0.88	0.72	0.87	1.10	0.74	0.85	0.86	0.85

Note: HD1: Human habitation (4 slides); HD2: Road construction (2 slides); HD3: Development level of trail (4 slides);
P: Preference F: Familiarity; L: Acceptable levels of development
Using t-test, * p<.05, ** p<.01

In regard to familiarity with the humanscape slides, Taiwanese were more familiar with all three dimensions than American were because all landscape slides were taken in Taiwan [$t_{HD1F}(471)=11.12$, $t_{HD2F}(474)=4.17$, $t_{HD3F}(470)=12.04$, $p<.01$]. Regarding acceptable levels of environmental development, significant differences occurred in road construction and the development levels of trail dimensions ($t_{HD2L}(474)=-7.31$, $t_{HD3L}(468)=-5.22$, $p<.01$). Americans accepted these development levels of road construction more than did the Taiwanese. Besides, Americans agreed with these levels of trail development more than did the Taiwanese.

In further analysis of the human habitation dimension (Table 4-11, and Appendix A), based on a single slide for each specific level of landscape character, Taiwanese preferred the landscape with a single cabin in the natural environment more than did the Americans [$t(472) =12.07$, $p<.01$]. On the other hand, a large temple in the natural environment was preferred by Americans more than the Taiwanese [$t(474)=-4.16$, $p<.01$]. When comparing the preference for a single cabin with a single temple in the natural environment, Taiwanese preferred the single cabin to the single temple [$t(284)= 24.33$, $p<.01$), while there was not much difference for Americans. The small village was more preferred for both groups when it was compared with the over-developed community [$t_{Taiwanese}(286) =6.76$, $p<.01$; $t_{American}(187)=10.64$, $p<.01$).

Table 4-11

The Preference Score for Each Humanscape Dimension

Stimuli	Subject	
	American	Taiwanese
Human habitation		
Single cabin (#7)**	2.66	3.83
Single temple (#8)**	2.64	2.26
Small village (#5)	2.43	2.33
Over-developed community (#6)	1.84	1.93
Road construction		
Well-paved (#4)**	3.50	3.16
Rough (#9)**	2.71	2.23
Development level of trail		
A trail along the mountain (#2)*	2.90	3.09
Small scale hiking trail (#1)**	2.18	2.48
High-developed route (#3)	2.34	2.30
Over-developed route (#10)**	1.95	1.57

Note: Using t-test, * $p<.05$, ** $p<.01$

For the road construction dimension, Americans gave higher preference scores to both road construction conditions compared to the Taiwanese ($t_{well\text{-}paved}(474)=-4.01$, $t_{rough}(474)=-5.20$, $p<.01$). Well-paved road conditions were more preferred for all subjects over the rough condition [$t_{Taiwanese}(286)=13.66$; $t_{American}(188)= 10.64$, $p<.01$].

For the development level of trails, significant differences occurred between the groups for the small scale hiking trail [$t(472)=3.34$, $p<.01$]; over-developed route [$t(472)=2.09$, $p<.01$]; and a trail along the mountain [$t(357.17)=-1.99$, $p<.05$]. When the degree of route development increased (from high-developed to over-developed), the

preference scores decreased for both the Taiwanese and Americans [$t_{Taiwanese}(285)=14.34$; $t_{American}(187)=7.22$, $p<.01$)].

Similar patterns were displayed in the reported opinions of acceptable levels of environmental development (Table 4-12). In the human habitation dimension, there were significant differences in opinions of acceptable levels in single cabin [$t(471)=6.34$, $p<.01$], single temple [$t(474)=-7.18$, $p<.01$], and small village [$t(472)=-4.12$, $p<.01$] slides. A single cabin was more acceptable than a single temple for the Taiwanese group [$t(284)=17.76$, $p<.01$], while there was not much difference for the American group. The small village was more acceptable than the over-developed community regardless of cultural background [$t_{Taiwanese}(286)=2.43$, $p<.05$; $t_{American}(186)= 7.59$, $p<.01$].

For the road construction dimension, there were significant differences in acceptable levels of development between well-paved and rough surface road for both groups [$t_{well\text{-}paved}(474)=-4.02$, $t_{rough}(474)=-7.47$, $p<.01$]. No matter which road condition, Americans had higher agreement than did Taiwanese. The well-paved condition was more acceptable than the rough road condition for all students [$t_{Taiwanese}(286)= 11.02$; $t_{American}(188)=5.46$, $p<.01$].

For the dimension of trail development, there were significant differences between groups for the small scale hiking trail [$t(470)=-2.33$, $p<.05$], high-developed route [$t(473)=-4.95$, $p<.01$], and the over-developed route

Table 4-12

Rated Acceptable Levels of Environmental Development for Each Humanscape Dimension

Stimuli	Subject	
	American	Taiwanese
Human habitation		
Single cabin (#7)**	3.10	3.73
Single temple (#8)**	2.96	2.34
Small village (#5)**	2.93	2.55
Over-developed community (#6)	2.28	2.37
Road construction		
Well-paved (#4)**	3.68	3.32
Rough (#9)**	3.23	2.51
Development level of trail		
A trail along the mountain (#2)	3.46	3.46
Small scale hiking trail (#1)*	3.11	2.87
High-developed route (#3)**	3.04	2.61
Over-developed route (#10)**	2.42	1.69

Note: Using t-test, * $p<.05$, ** $p<.01$

[$t(473)=-7.86$, $p<.01$]. When the development level of the trail increased, the opinions of acceptance for both groups decreased. Except the similar responses for both groups in the condition of a trail along the mountain, Americans reported higher development acceptability scores in the other three conditions than Taiwanese did in this dimension.

DISCUSSION AND CONCLUSIONS

Discussion of Results

In this study, differences in landscape preference and familiarity were tested among American and Taiwanese students, as well as acceptance of various levels of development in natural environments. Significant differences in landscape preferences were observed between Taiwanese and American subjects for selected landscape types: mountainscapes and waterscapes. It is suggested that when cultural backgrounds are truly different (such as language, belief, custom, and behavior), the landscape perceptions and preferences are different.

Familiarity scores showed modest, but significant and positive relationships with landscape preference ratings. Although this result supported the hypothesis in this study, slide selection was a major factor influencing the degree of familiarity. This result could provide some indications of why familiarity had either a positive or negative relationship with landscape preference in previously studies.

In addition, the comparison of acceptable levels of environmental development across the two student groups suggested differences as well. All subjects, regardless of the cultural background, preferred natural landscapes to the landscapes which had been influenced by humans. It is implied that artificial constructions were not as preferred as natural

elements in the environment.

For mountainscapes, the students preferred the normal position for viewing as seen in the slides. Standing at the top of a hill seemed more attractive than the inferior position for the American group, while Taiwanese had reverse ratings for these two positions. Two explanations are worth considering. One explanation could be the influence of the different geographical features in the students' respective home environments. Mountainscapes are not major geographical features of the Great Lakes region. People who live in these larger flat places do not have much chance to stand in a higher position where the view is wide open. The other reason could be cultural. Since the philosophy of Chinese culture is to prefer nature, respect nature, and imitate nature, standing at the top of a mountain to prove humans' confidence and to overcome nature are not the main themes of Chinese thoughts. From Chinese paintings, we can easily find many examples of this philosophy. Human figures are always painted to be very small in Chinese art. In his book, The Importance of Living, Lin (1937) described the details of Chinese painting:

> In a Chinese landscape called 'Looking at a Mountain After Snow,' it is very difficult to find the human figure supposed to be looking at the mountain after snow. After a careful search, he will be discovered perching beneath a pine tree -- his squatting body about an inch high in a painting fifteen high, and done in no more than

a few rapid strokes. (p. 281)

In Chinese art, as illustrated by this example, human subjects are not a main point to be emphasized in natural environments, although humans are major characteristic in the whole story. In contrast, humans are representatives of God in Western religious thought. Examples which emphasis human dominating the nature can be found easily in many religious paintings. In a medieval miniature that depicts Adam naming the beasts, this picture not only indicates Adam (human) has the privilege of naming the beasts but also it puts Adam character in the superior position of the picture (McAndrew, 1993).

With respect to waterscapes, a landscape which combined mountains and water had the highest preference scores. This suggested that a combination of physical elements in a landscape setting was more attractive than a single major geographical feature in a landscape. For the American group, the distance factor seemed more important than the water condition factor. Taiwanese preferred to be near water, and were attracted by the still water condition. It is inferred that people are likely to be near the water to enjoy what experiences water could provide (such as fresh and moist atmosphere, dynamic conditions, and the inspiration of water sounds). Besides, if the water scene was near by, Americans were not concerned about whether the water was moving or

still. Although Taiwanese like to be near water, safety and peaceful feelings (still water condition) were most preferred by Taiwanese. In summary, the excitement of being near the water scene was attractive to the Americans, whereas the more peaceful and quiet aspects of the water scenes were more acceptable for Chinese people. In many landscape projects, we see waterfalls or fountains (moving water conditions) as principal objects in Western style gardens, while ponds or small scale lakes (still water conditions) are more prevalent in Chinese gardens to attempt to imitated natural scenery.

Humanscape was the least preferred landscape type among the three landscape categories shown to students. Obvious human influences in the natural environment were not preferred by the students. Preference ratings had a positive relationship with reported acceptable levels of environmental development. It was indicated that the higher the preference score for a particular humanscape scale, the more agreement among subjects with respect to the degree of development. Based on slide comparisons, lower levels of development were more preferred than higher levels of development for both Taiwanese and Americans in each dimension of humanscape. Besides, when the degree of human development goes beyond acceptability, Taiwanese reported stronger reactions than did Americans. One possible explanation is that natural resources are very rare and precious in Taiwan. So, Taiwanese pay more attention to or more sensitivity to environmental development

issues, and are more aggressive regarding these problems. Although most Americans are knowledgeable about environmental development and conservation issues, the American subjects did not report as strong reaction as Taiwanese subjects did to the scale of increased human development observed in the slides.

In summary, both American and Taiwanese subjects had common preference patterns in this study such as they all preferred waterscapes among these three types of landscape. When we look into the detailed physical components, it is suggested that the preferences for and opinions about environmental development issues for specific landscape types have been influenced by cultural background variables. Different cultural backgrounds appear to influence people's perceptions of landscapes. In the Chinese mind, by association with nature's enormities, a man's heart may truly grow big (Lin, 1937). The experience of nature for Chinese is not only enjoying the natural scenic beauty but also respecting what nature could give to us. Lin (1937) described what the experience of nature could be:

> There is a way of looking upon a landscape as a moving picture and being satisfied with nothing less big as a moving picture, a way of looking upon tropic clouds over the horizon as the backup of a stage and being satisfied with nothing less big as a backdrop, a way of looking upon the mountain forests as private garden and being satisfied with nothing less as a private garden. (p.282)

Conclusions

Application

There are a number of findings in this study that provided noteworthy insights for the landscape planning and design profession. The finding that cultural differences may influence people's preference in certain types of landscapes should be paid attention to. When designing a landscape project involving cross-cultural issues, such as a resort area for international tourist, decisions should not be subjectively based on one's own cultural background.

Viewing perspectives need to be well considered when designing a scenic point for tourists in a recreation area. Providing a landscape that combines varied geographical elements such as hills, water, vegetation would be more attractive than a scene containing only one single element. In other words, juxtaposition (a series of arrangements of scenery) is a major consideration in increasing people's attention. The water situation is another main issue in landscape design. In Yang's study (1988), combining water with vegetation enhanced landscape preference. Since water is a popular element for people, providing the opportunity to let people to be near water to see, feel, and hear the nature of water would enhance people's landscape preference, and then increase the degree of satisfaction.

Natural scenes are more acceptable and preferable than human-influenced landscapes for people. It is suggested that

reducing human influences to provide optimum outdoor experiences for people is important. However, some artificial development in a natural environment is unavoidable in our real world. Designing facilities to make them more appropriate in a natural setting through aspects of color, texture, and form is a proper way to provide less interruption to the natural environment, and produce both a high quality of scenic beauty and the satisfaction of human needs in landscape planning projects.

Because slide origin affects degree of familiarity, and because familiarity is associated with landscape preference, the results suggested that selection of materials or symbols of stimuli in a landscape perception study is a very important variable which is related to people's preference. For example, in order to avoid the influence of slide origin upon familiarity, stimuli should be taken from a single country, or choose stimuli which are totally unfamiliar to the subjects. This type of research design would provide results to better understand perceived familiarity and its relationship with landscape preferences.

According to a previous study (Vining et al., 1984), human influences such as temporary artifacts, feature incongruity, building materials, and residential crowding detracted from scenic quality in forest developments. In this study, several landscapes obviously influenced by human developments (human habitation, road construction, and

development level of trail) were presented. They were presented to evaluate preference scores as well as the degree of acceptability of human development in natural environments. It was observed that human intrusion in natural environments was an important issue related to people's landscape perceptions and preferences. Although the criteria we used to measure human intrusion were subjective, these variables could still provide a heuristic "first cut" to further an understanding of human conceptions of the environment (Vining et al., 1984). In other words, using subjective criteria to measure human influence in the natural environment still provides useful and meaningful results in landscape perception and preference studies.

Future Studies

Although the proposed hypotheses were confirmed, future studies are still needed to overcome the limitations of this study. Previously, researchers focused upon cross-cultural differences in landscape preference have only paid attention to the differences of physical environment. Discussions of why and how cultural factors influence landscape perception have been limited. Even in this study, theory was limited, with minor references to the strong or weak relationships between culture and environment (Berry, 1975); what is needed are more in-depth theoretical analysis of the relationship between culture and landscape perception.

Sampling is a very important step in the research process, especially in studies of cross-cultural differences. In this study, limited by time and budget, American and Taiwanese students were selected, representing only a small portion of American and Taiwanese cultures. Future studies need to include samples of business people, laborers, the elderly, and children. In Yang's study (1988), he found that age is a major factor associated with preference. Age could not be explored as a variable to estimate preference in this study because the sample was homogenous in terms of age.

The landscape types represented in this study included mountainscapes, waterscapes, and humanscapes. These scenes were too general to produce an analysis of detailed differences based on landscape features such as land form and texture. In addition, the aesthetic attributes such as color and degree of brightness, and psychological factors (mystery or complexity) which also play important roles in assessing landscape preference were not measured in this study. For example, a study reported that "The results point to the importance of using different predictor domains, rather than relying exclusively on any one, since their role in different environmental contexts is likely to vary" (Kaplan et al., 1989, p.509). Future studies should focus not only on physical features but also upon systematic differences in aesthetic and psychological attributes in order to understand landscape perception comprehensively.

The demographic variables such as residence and travel variables showed significant correlation with landscape preference. In their study, Tips and Savasdisara (1986) found small differences of opinions related to the residence factor, and travel variables had a minor influence on the visual evaluation of landscape photographs. Since these two variables were not a major consideration in this study, future studies could test the validity of these two variables in detail as predictors of landscape preference.

In the world today, viewing scenery is one of the major outdoor recreation activities which is related to landscape perception and preference. Nature provides magnificent scenery and opportunities for people during their leisure time to pursue a recreation experience. The object of landscape preference research is to reveal the charm and interest of nature for people. The role which landscape professionals play is to protect and preserve the integrity of these natural features as well as the cultural and natural visual resources. The research techniques and theories used, and results presented in this study offer useful information to those who manage landscape resources. In doing so, it provides a chance to better understand visual experiences across cultures.

APPENDIX A

STIMULI

APPENDIX A: STIMULI

Mountainscape Slides

Superior position (M1)

1
Americans: 3.13
Taiwanese: 3.13

4
Americans: 3.65
Taiwanese: 3.09

5
Americans: 3.37
Taiwanese: 3.07

6
Americans: 3.51
Taiwanese: 3.60

15
Americans: 3.36
Taiwanese: 2.72 **

Normal position (M2)

7
Americans: 3.67
Taiwanese: 3.32

8
Americans: 3.63
Taiwanese: 3.80

9
Americans: 3.44
Taiwanese: 3.14

11
Americans: 3.16
Taiwanese: 2.97

13
Americans: 3.81
Taiwanese: 3.47

Inferior position (M3)

2
Americans: 4.34 *
Taiwanese: 4.27 *

3
Americans: 3.41
Taiwanese: 3.06

10
Americans: 2.99
Taiwanese: 2.76

12
Americans: 3.20
Taiwanese: 3.31

14
Americans: 2.55 **
Taiwanese: 2.88

Note: * the highest preference score
** the lowest preference score

Waterscape Slides

Distance Dimension (W1 & W2)

Near category (less than 10 feet, W1)

5
Americans: 4.19
Taiwanese: 3.60

4
Americans: 3.93
Taiwanese: 3.61

2
Americans: 4.37
Taiwanese: 4.24

Far category (more than one mile, W2)

1
Americans: 4.23
Taiwanese: 4.07

3
Americans: 3.64
Taiwanese: 3.69

8
Americans: 3.48 **
Taiwanese: 2.93 **

Combined Landscape (W3)

6
Americans: 4.70 *
Taiwanese: 4.57

7
Americans: 4.70 *
Taiwanese: 4.58 *

9
Americans: 4.51
Taiwanese: 4.10

Water Condition (W4 & W5)

Moving water (W4)

1
Americans: 4.23
Taiwanese: 4.07

4
Americans: 3.93
Taiwanese: 3.61

5
Americans: 4.19
Taiwanese: 3.60

8
Americans: 3.48 **
Taiwanese: 2.93 **

Still water (W5)

2
Americans: 4.37
Taiwanese: 4.24

3
Americans: 3.64
Taiwanese: 3.69

Note: * the highest preference score
** the lowest preference score

Humanscape Slides

Human habitation (HD1)

7 (single cabin)
Americans: 2.66 / 3.10
Taiwanese: 3.83* / 3.73*

8 (single temple)
Americans: 2.64 / 2.96
Taiwanese: 2.26 / 2.34

5 (small village)
Americans: 2.43 / 2.93
Taiwanese: 2.33 / 2.55

6 (over-developed community)
Americans: 1.84** / 2.28**
Taiwanese: 1.93 / 2.37

Road construction (HD2)

4 (Well-paved)
Americans: 3.50* / 3.68*
Taiwanese: 3.16 / 3.32

9 (Rough)
Americans: 2.71 / 3.23
Taiwanese: 2.23 / 2.51

Trail development level (HD3)

2
(a trail along the mountain)
Americans: 2.90 / 3.46
Taiwanese: 3.09 / 3.46

1
(small scale hiking trail)
Americans: 2.18 / 3.11
Taiwanese: 2.48 / 2.87

3
(high-developed route)
Americans: 2.34 / 3.04
Taiwanese: 2.30 / 2.61

10
(over-developed route)
Americans: 1.95 / 2.42
Taiwanese: 1.57** / 1.69**

Note: 1. preference score / opinion of acceptable level
2. * the highest preference score
** the lowest preference score

APPENDIX B

QUESTIONNAIRE

APPENDIX B: QUESTIONNAIRE

ENVIRONMENTAL PERCEPTION AND PREFERENCE
-- A CROSS-CULTURAL STUDY --

I am conducting a research on the differences in environmental perceptions and preferences between American and Taiwanese student. I would appreciate your help and participation in this survey. Your answers and opinions will help us understand people's perception of landscapes and evaluate the quality of natural environments in Taiwan and the US.

This survey is voluntary, you are under no obligation to participate. But, we hope you will find the survey to be an interesting experience and will consent to participate. Even if you participate, you may choose not to answer certain questions. All results will be treated with the strictest confidence and will remain anonymous in any report or discussion.

Ying-Hung Li
Graduate Student
Department of Park & Recreation Resources
Michigan State University
East Lansing, MI 48823, USA

If you agree to participate in this survey, please fill in these blanks:
Date of Survey _____ Place of Survey _____

Instruction

In this study, we would like to know your personal preferences and attitudes about the natural environment. There are four parts in this questionnaire. The first two parts ask your preferences and familiarity with two types of landscapes (mountainscape and waterscape) as shown in the slides. The third part asks your personal attitudes toward the level of acceptable development of the natural environment along with your preferences and familiarity for each slide. The final part asks some questions about your personal background and travel experience.

The preference scores are given in terms of a liking scale (whether you like it or not). The rating scale is from 1 (do not like it at all) to 5 (like it very much).

The rating of familiarity is measured in terms of the degree of familiarity (are you familiar with this type of landscape) with each slide. The rating scale is from 1 (not familiar) to 5 (very familiar).

The attitudes toward the level of acceptable development of the natural environment is measured by way of asking the question "This level of development of the natural environment is acceptable." at each landscape slide. The rating scale is from 1 (strongly disagree) to 5 (strongly agree).

Slide will be shown during the first three parts of survey. The investigator will call out slides number to help you correctly match your scores with the slide.

For each type of landscape slide, fill in the number that best represent your feeling about the landscape.

Part 1 --

In this part, we would like to know your preferences of mountainscape, and the degree of familiarity with each mountainscape slide.

Preference : Please rate how much do you like each landscape slide. **"I like this landscape _____."**

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all a little somewhat quite a bit very much

Familiarity: Please rate how familiar you are with each landscape slide. **"I am _____ familiar with this type of landscape."**

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not very a little somewhat quite a bit very

slide #.	preference	familiarity
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Part 2 --

In this part, we would like to know your preferences of waterscape, and the degree of familiarity with each waterscape slide.

Preference : Please rate how much do you like each landscape slide. **"I like this landscape _____."**

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all a little somewhat quite a bit very much

Familiarity: Please rate how familiar you are with each landscape slide. **"I am _____ familiar with this type of landscape."**

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not very a little somewhat quite a bit very

slide #	preference	familiarity
1		
2		
3		
4		
5		
6		
7		
8		
9		

Part 3 --

In this part, we would like to know your preferences and familiarity of development level, and the level of acceptable of environmental development with each slide.

Preference : Please rate how much do you like each landscape slide. **"I like this landscape _____."**

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all a little somewhat quite a bit very much

Familiarity: Please rate how familiar you are with each landscape slide. **"I am _____ familiar with this type of landscape."**

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not very a little somewhat quite a bit very

Level of acceptable development: Please rate your personal opinion for each slide concerning this question: **"This level of development of the natural environment is acceptable."**

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
strongly disagree a little disagree neutral a little agree strongly agree

Slide #	preference	familiarity	this level of development is acceptable
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Part 4 --

Finally, we would like to know your personal background.

* Sex: male _____ female _____ * Nationality _____

* Age: _____

* Where did you live before the age of 14:

  urban area _____ suburban area _____ rural area _____

* Are you:

  graduate student _____ senior _____ junior _____

  sophomore _____ freshman _____

* What is your major: _____

* How many countries have you visited during your travels?

  please list those countries you have visited:

  _____

不同文化對景觀認知及偏好的差異研究

您好，我們正在從事一項有關於不同文化背景的學生對景觀的認知及喜好是否有所不同之研究，很感謝您的參與及合作，您的意見及看法將有助於我們對於不同文化上對景觀偏好的了解，以及進一步提昇環境品質的努力有極大的幫助，此項問卷調查所得資料將僅供學術上的研究及參考，謝謝。

■說明

本問卷內容主要是想了解您個人對環境的認知及偏好，一共分成四大部份。第一～三部份是測量您對景觀幻燈片的喜好程度及熟悉程度。景觀喜好程度由 1 分（非常不喜歡）到 5 分（非常喜歡）。景觀熟悉程度由 1 分（完全不熟悉）到 5 分（非常熟悉）。在第三部份，我們另外再測量您對自然環境開發的接受程度，由 1 分（完全不同意）到 5 分（完全同意），第四部份是了解您的個人基本資料及您的旅遊經驗。

在調查過程中，我們會提醒每一張景觀幻燈片的次序，以便於您在回答問題時不會填錯位置。

在開始進行調查之前，請寫下調查日期及地點。

日期：_____年_____月_____日

地點：_____

第一部份：依據下列標準，寫出您對山岳景觀的喜好程度及熟悉程度。

喜好程度：〞我＿＿＿＿＿＿這張景觀幻燈片〞

1.——2.——3.——4.——5.

非常不喜歡　不太喜歡　有些喜歡　喜歡　非常喜歡

熟悉程度：〞我＿＿＿＿＿＿這張景觀幻燈片〞

1.——2.——3.——4.——5.

非常不熟悉　不太熟悉　有些熟悉　熟悉　非常熟悉

幻燈片	喜好程度	熟悉程度	幻燈片	喜好程度	熟悉程度
1			9		
2			10		
3			11		
4			12		
5			13		
6			14		
7			15		
8					

第二部份：依據下列標準，寫出您對水域景觀的喜好程度及熟悉程度。

喜好程度：〞我＿＿＿＿＿＿這張景觀幻燈片〞

1.——2.——3.——4.——5.

非常不喜歡　不太喜歡　有些喜歡　喜歡　非常喜歡

熟悉程度：〞我＿＿＿＿＿＿這張景觀幻燈片〞

1.——2.——3.——4.——5.

非常不熟悉　不太熟悉　有些熟悉　熟悉　非常熟悉

幻燈片	喜好程度	熟悉程度	幻燈片	喜好程度	熟悉程度
1			6		
2			7		
3			8		
4			9		
5					

第三部份：依據下列標準，寫出您對人爲景觀的喜好程度，熟悉程度及自然環境開發的接受程度。

喜好程度：〞我＿＿＿＿＿＿這張景觀幻燈片〞

1.——2.——3.——4.——5.

非常不喜歡　不太喜歡　有些喜歡　喜歡　非常喜歡

熟悉程度：〞我＿＿＿＿＿＿這張景觀幻燈片〞

1.——2.——3.——4.——5.

非常不熟悉　不太熟悉　有些熟悉　熟悉　非常熟悉

自然環境的開發程度：〞在這張幻燈片中，此種程度的發展是可以接受的。

1.——2.——3.——4.——5.

完全不同意　不太同意　沒有意見　有些同意　非常同意

幻燈片	喜好程度	熟悉程度	開發程度	幻燈片	喜好程度	熟悉程度	開發程度
1				6			
2				7			
3				8			
4				9			
5				10			

第四部份：

最後，我們想了解您個人的基本資料及旅遊經驗。

1.性別：男＿＿＿＿女＿＿＿＿　2.國籍：＿＿＿＿＿＿＿＿

3.年齡：＿＿＿＿＿＿＿＿

4.在您14歲以前，是住在

都市地區＿＿＿＿，市郊地區＿＿＿＿，鄉下地區＿＿＿＿

5.您是：研究生＿＿＿，大四＿＿＿，大三＿＿＿，大二＿＿＿，大一＿＿＿。

6.主修系別：＿＿＿＿＿＿＿＿

7.在您的旅遊經驗中，一共去過幾個國家：＿＿＿＿

請列出國名：＿＿＿＿＿＿＿＿

APPENDIX C

FINDINGS FOR EACH SLIDE BY CONDITION

APPENDIX C: FINDINGS FOR EACH SLIDE BY CONDITION

Table C-1

American Subjects

Mountainscape Slides

slide #.	preference / Sd	familiarity / Sd
1	3.13 / 0.99	2.20 / 1.08
2	* 4.34 / 0.78	2.83 / 1.10
3	3.41 / 1.01	2.39 / 1.09
4	3.65 / 1.02	2.44 / 1.09
5	3.37 / 1.10	2.51 / 1.22
6	3.51 / 1.05	2.33 / 1.10
7	3.67 / 0.97	2.53 / 1.20
8	3.63 / 1.05	2.46 / 1.08
9	3.44 / 1.05	2.34 / 1.10
10	2.99 / 1.23	2.32 / 1.18
11	3.16 / 1.13	2.62 / 1.17
12	3.20 / 1.06	2.41 / 1.08
13	3.81 / 0.97	2.76 / 1.13
14	** 2.55 / 1.10	2.05 / 1.00
15	3.36 / 1.09	2.30 / 1.10
Total (means)	3.40 / 0.71	2.42 / 0.86

Note: * the highest score; ** the lowest score

Waterscape Slides

slide #.	preference / SD	familiarity / SD
1	4.23 / 0.85	3.34 / 1.18
2	4.37 / 0.74	3.99 / 1.12
3	3.64 / 0.93	3.06 / 1.12
4	3.93 / 1.02	3.84 / 1.21
5	4.19 / 0.99	2.93 / 1.14
6	* 4.70 / 0.64	2.76 / 1.28
7	* 4.70 / 0.62	2.73 / 1.28
8	** 3.48 / 1.24	2.21 / 1.16
9	4.51 / 0.85	2.69 / 1.22
Total (means)	4.19 / 0.59	3.06 / 0.83

Note: * the highest score; ** the lowest score

Humanscape Slides

slide #	reference / SD	familiarity / SD	this level of development is acceptable / SD
1	2.18 / 1.05	2.05 / 1.04	3.11 / 1.16
2	2.90 / 1.08	2.34 / 1.02	3.46 / 1.04
3	2.34 / 1.05	2.22 / 1.01	3.04 / 0.94
4	* 3.50 / 0.95	3.36 / 1.20	* 3.68 / 0.84
5	2.43 / 1.01	2.40 / 1.04	2.93 / 0.96
6	** 1.84 / 0.99	2.40 / 1.20	** 2.28 / 1.12
7	2.66 / 1.22	2.38 / 1.11	3.10 / 1.11
8	2.64 / 1.13	2.33 / 1.01	2.96 / 1.04
9	2.71 / 1.08	3.17 / 1.21	3.23 / 1.02
10	1.95 / 1.01	2.38 / 1.10	2.42 / 1.13
Total (means)	2.52 / 0.73	2.50 / 0.81	3.02 / 0.60

Note: * the highest score; ** the lowest score

Table C-2

Taiwanese Subjects

Mountainscape Slides

slide #.	preference / SD	familiarity / SD
1	3.13 / 0.95	2.73 / 0.92
2	* 4.27 / 0.81	2.91 / 1.04
3	3.06 / 0.98	2.72 / 1.00
4	3.09 / 0.95	3.44 / 0.99
5	3.07 / 0.97	3.35 / 1.04
6	3.60 / 0.91	3.06 / 1.05
7	3.32 / 0.87	3.26 / 0.98
8	3.80 / 0.88	3.13 / 1.00
9	3.14 / 0.94	2.83 / 0.97
10	2.76 / 1.04	2.98 / 1.07
11	2.97 / 1.16	2.69 / 1.10
12	3.31 / 0.93	2.58 / 0.92
13	3.47 / 1.07	2.47 / 0.97
14	2.88 / 1.10	2.49 / 0.97
15	** 2.72 / 0.99	2.85 / 0.96
Total (means)	3.23 / 0.56	3.40 / 0.71

Note: * the highest score; ** the lowest score

Waterscape Slides

slide #.	preference / SD	familiarity / SD
1	4.07 / 0.87	3.22 / 1.06
2	4.24 / 0.80	3.03 / 1.08
3	3.69 / 1.02	2.61 / 1.02
4	3.61 / 1.00	3.35 / 1.12
5	3.60 / 0.91	3.24 / 1.09
6	4.57 / 0.65	2.47 / 1.02
7	* 4.58 / 0.77	2.49 / 1.21
8	** 2.93 / 1.04	2.64 / 1.15
9	4.10 / 0.87	2.48 / 1.01
Total (means)	3.93 / 0.51	2.84 / 0.68

Note: * the highest score; ** the lowest score

Humanscape Slides

slide #	reference / SD	familiarity / SD	this level of development is acceptable / SD
1	2.48 / 0.91	2.81 / 1.02	2.87 / 1.04
2	3.09 / 0.92	3.24 / 0.97	3.46 / 0.99
3	2.30 / 0.79	3.24 / 1.01	2.61 / 0.91
4	3.16 / 0.92	3.62 / 0.93	3.32 / 1.03
5	2.33 / 0.91	3.26 / 0.95	2.55 / 0.98
6	1.93 / 0.87	3.72 / 0.97	2.37 / 1.14
7	* 3.83 / 0.89	2.94 / 0.98	* 3.73 / 1.03
8	2.26 / 0.83	2.96 / 0.98	2.34 / 0.84
9	2.23 / 0.92	3.66 / 0.94	2.51 / 1.04
10	** 1.57 / 0.74	3.41 / 1.04	** 1.69 / 0.88
Total (means)	2.52 / 0.50	3.28 / 0.71	2.74 / 0.46

Note: * the highest score; ** the lowest score

APPENDIX D

STATISTICAL RESULTS IN FIGURES

APPENDIX D: STATISTICAL RESULTS IN FIGURES

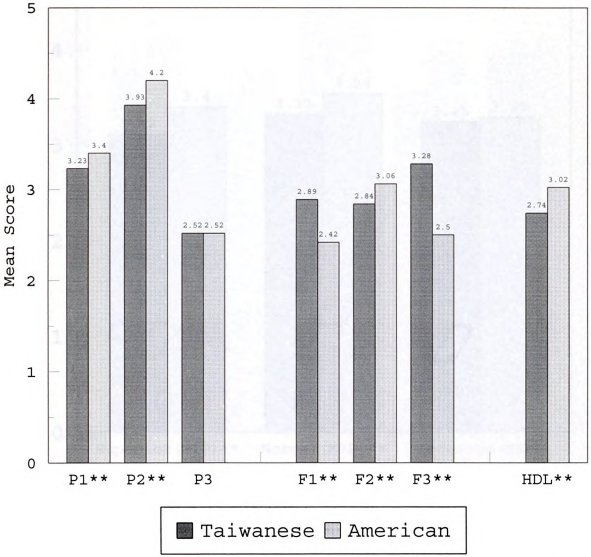

Figure D-1 The mean score for preference, familiarity, and acceptable levels of environmental development for each nationality

Note: P1: Preference for Mountainscape F1: Familiarity for Mountainscape
P2: Preference for Waterscape F2: Familiarity for Waterscape
P3: Preference for Humanscape F3: Familiarity for Humanscape
HDL: Acceptable Levels of Environmental Development
Mountainscape: 15 slides; Waterscape: 9 slides
Humanscape: 10 slides; Using t-test, * p<.05, ** p<.01

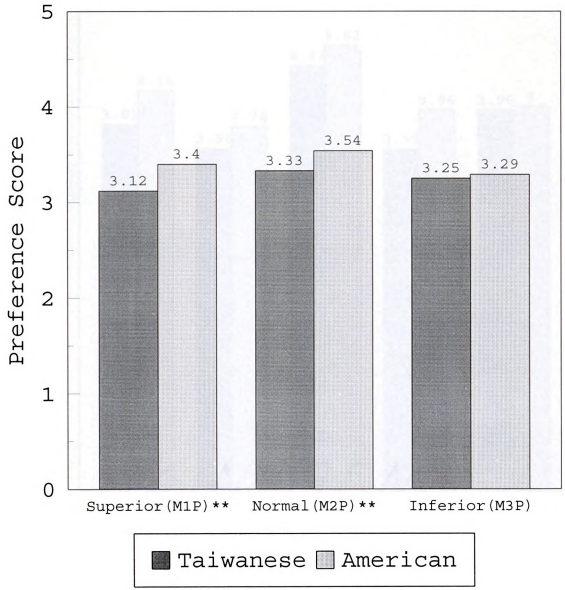

Figure D-2 The preference score for mountainscape slides

Note: Using t-test, *<p.05, ** p<.01

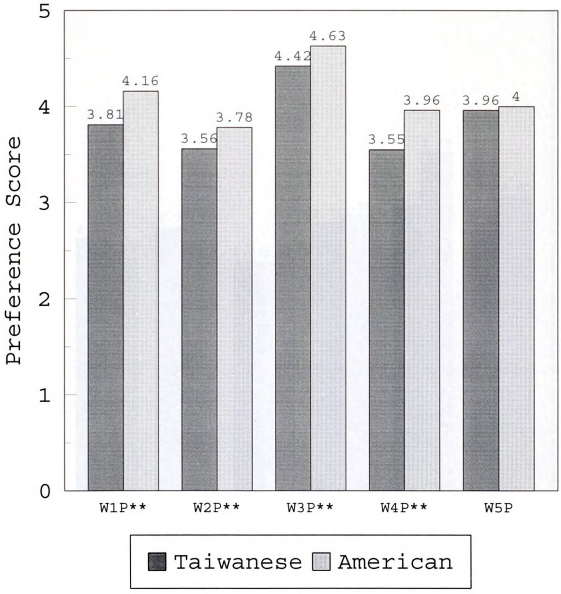

Figure D-3 The preference score for each dimension in the waterscape condition

Note: W1: Near range of distance (less than 10 feet, 3 slides)
W2: Far away range of distance (more than one mile, 3 slides)
W3: Combined landscape (3 slides)
W4: Moving water condition (4 slides)
W5: Still water condition (2 slides)
Using t-test, * p<.05, ** p<.01

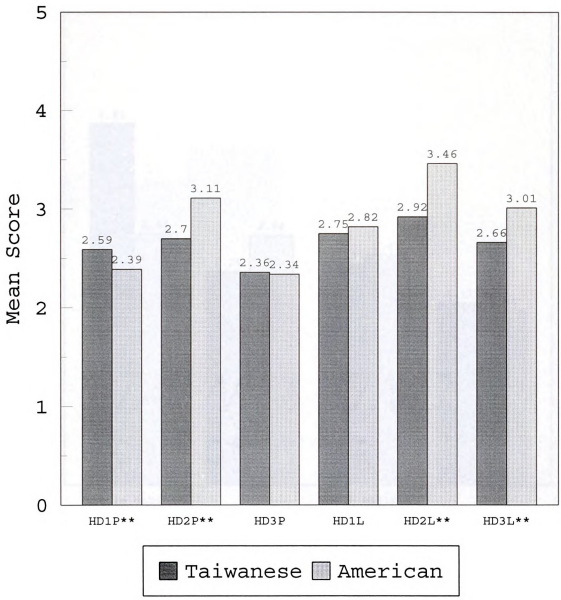

Figure D-4 The mean score for preference and acceptable levels of development in humanscape slides

Note: HD1: Human habitation (4 slides) HD2: Road construction (2 slides)
HD3: Development level of trail (4 slides)
P: Preference; L: Acceptable level of development
Using t-test, * p<.05, ** p<.01

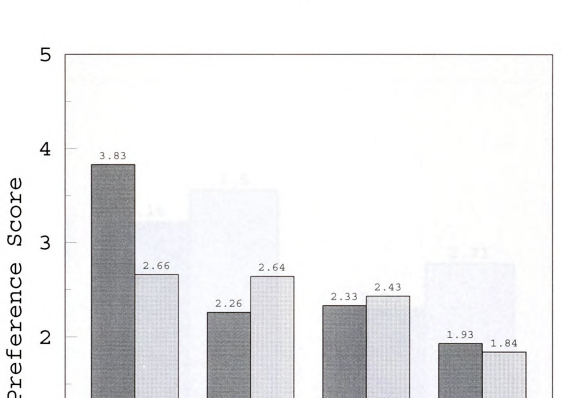

Figure D-5 The preference score for the human habitation dimension

Note: 1. Each level was represented by one slide.
2. The degree of human habitation ranges from one single cabin to an over-developed community.
3. Using t-test, *p<.05, ** p<.01

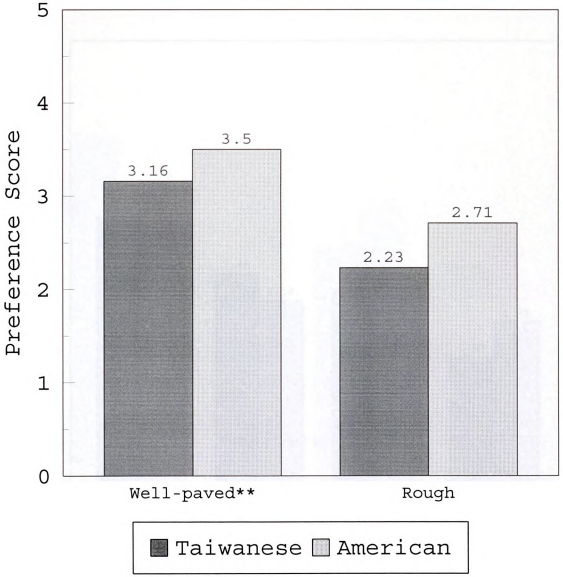

Figure D-6 The preference score for the road construction dimension

Note: 1. Each scales was represented by one slide.
2. Using t-test, * p<.05, ** p<.01

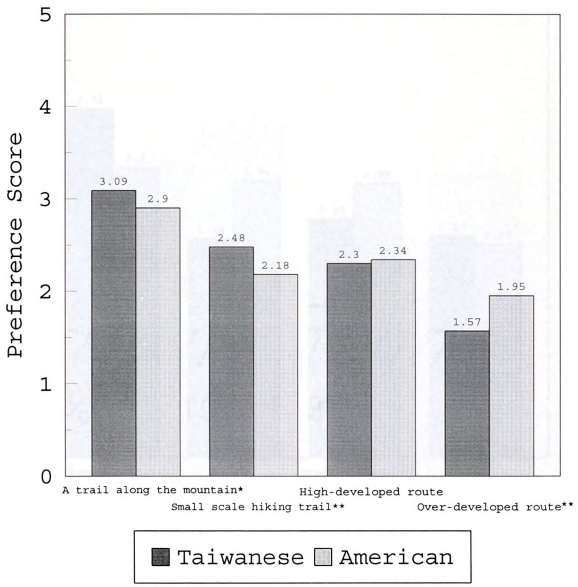

Figure D-7 The preference score for levels of development of trail

Note: 1. Each scale was represented by one slide.
2. The degree of tail development is from a trail along the mountain to an over-developed route.
3. Using t-test, * p<.05, ** p<.01

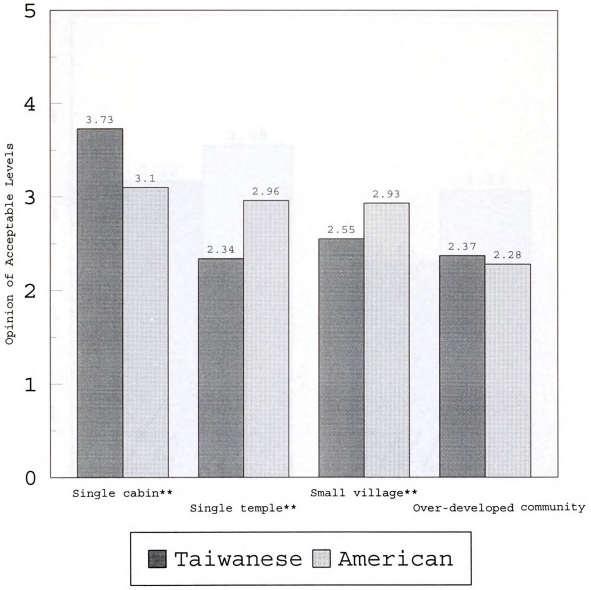

Figure D-8 Acceptable levels of environmental development for the human habitation dimension

Note: 1. Each level was represented by one slide.
2. The degree of human habitation ranges from one single cabin to an over-developed community.
3. Using t-test, * $p<.05$, ** $p<.01$

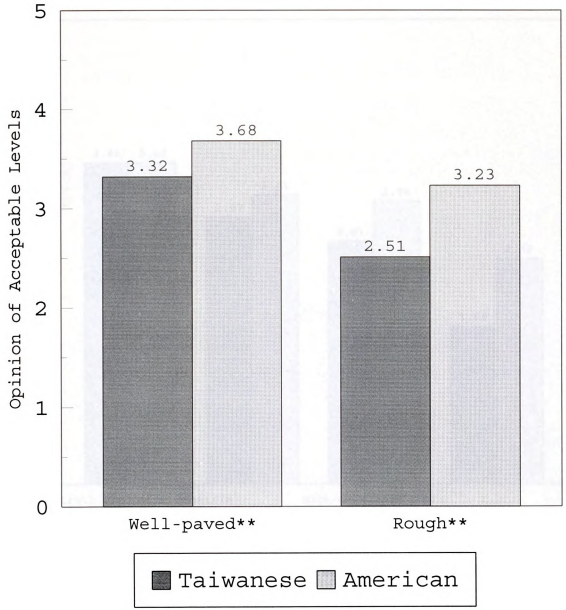

Figure D-9 Acceptable levels of environmental development for the road construction dimension

Note: 1. Each scale was represented by one slide.
2. Using t-test, * p<.05, ** p<.01

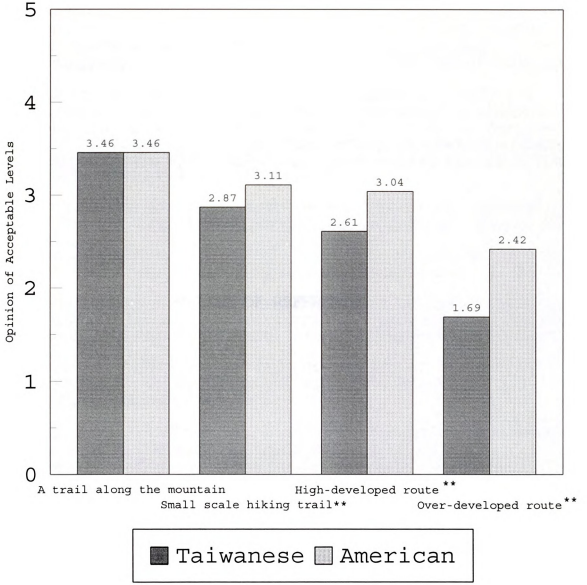

Figure D-10 Acceptable levels of environmental development for the dimension of trail

Note: 1. Each scale was represented by one slide.
2. The degree of trail development is from a trail along the mountain to an over-developed route.
3. Using t-test, * p<.05, ** p<.01

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