A CROSS-CULTURAL STUDY OF PROSPECT-REFUGE THEORY

by

Yuemao Xu

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Approved :

Patrick A. Miller

Benjamin Johnson

Leila Bailey Van Hook

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Yuemao Xu
Dr. Patrick A. Miller, Major Professor

Landscape Architecture
Virginia Polytechnic and State University

ABSTRACT

Increasing international attention has been directed to the landscape perception research in the past three decades. Much research has been done. And there is a growing need for a consistent and comprehensive theoretical framework to guide the multi-disciplinary nature of the field.

Two broad bases for such a comprehensive theoretical framework have been identified: biological perspective and cultural explanation. This study is developed to validate one of the major theories in the biological perspective to landscape perception--prospect-refuge theory. The theory postulates that landscapes with opportunities to see (prospect) and places to hide (refuge) are aesthetically pleasurable as they satisfy humans' basic survival needs.

Landscape paintings of different historical periods in Chinese and Western cultures were adopted as a medium of study. Paintings representative of various historical periods and diverse styles were selected and rated for preference, prospect, and refuge by Chinese students and spouses at Virginia Tech. The study found that Prospect-refuge symbolic system was present in Chinese and Western landscape paintings in different historical periods. However, no statistically significant support was found for the theory.

The study concluded that prospect-refuge seems to be a common landscape

perception system and seems to be biologically related. However, the validity of the prospect-refuge theory is still under question. More research is needed to understand humans' common perception that are shared at the biological level.

To My Father

In gratitude for his enduring encouragement
to search for the best.

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CONTENTS

TABLES

FIGURES

I. INTRODUCTION

For thousands of years, the grand landscapes have evoked enormous fascination, imagination, and affection in viewers. In the arms of these grand landscapes, humans have carried on their lives generation by generation, and have continuously expressed their great attraction towards nature. Why do humans harbor an unfailing affection for landscapes? How does it happen?

For generations, through the hands of literati and painters, much has been recorded on this subject. Yet, it was not until three decades ago that the systematic study of this subject started. In the 1960s, ecology emerged as a new science, sparking a growing awareness of the deteriorating environment. This awareness has prompted the systematic study of the environment in a number of countries. Over the years, individuals from a variety of disciplines and professions have been involved in the study of landscape perception. Through much research, diverse theories and concepts have emerged. On the practical level of landscape management, planning and design, several landscape evaluation models have been established. Yet, due to the multi-disciplinary nature of the field and relatively short period of research, there is a consensus that a comprehensive theoretical framework is lacking in the field (Appleton, 1975b; Bash, 1972; Bourassa, 1990; Carter, 1976; Eaton, 1989; Penning-Rowsell, 1981; Porteous, 1982; Priestley, 1983; Punter, 1982; Sancar, 1985; Zube et al., 1982). This has made many research results fragmentary.

Meanwhile, the landscape research field is still confronted with many basic

questions such as: What is a landscape? What is the landscape aesthetic? Is the landscape aesthetic an objective property that lies within the landscapes or a subjective personal impression? Is landscape aesthetic a constant over time between different groups in diverse cultures? Questions like these are of cross-cultural, cross-historical, and multi-disciplinary nature. Only if we obtain understandings of such questions, will the vast amount of scholarly endeavors reach the level of rational applications and the purposes of landscape research--landscape preservation, management, planning and design--be fulfilled. To understand questions of such importance and complexity, one needs the joint-effort and cooperation of many disciplines. This situation demonstrates the need to establish a comprehensive theoretical framework which will be acknowledged by all disciplines and professions involved in the area of landscape research. To use Kuhn's term (Kuhn, 1970), the landscape research field is in need of a "paradigm"-- a comprehensive theoretical framework.

In the search for a comprehensive theoretical framework, two broad bases have been identified: biological perspective and cultural explanation. The biological perspective for landscape research was first contributed by the Prospect-refuge theory (Appleton, 1975a). This theory associates landscape preference with a typology of landscape making use of the findings of biological and behavioral sciences. Appleton (1975a) proposes that the "aesthetic pleasure in landscape derives from the observer experiencing an environment favorable to the satisfaction of his biological needs," and that "because the ability to see without being seen is an intermediate step in the satisfaction of many of those needs, the capacity of an environment to ensure the

achievement of this becomes a more immediate source of aesthetic satisfaction" (p. 73). In other words, landscapes that provide humans with opportunities to see (prospect) and places to hide (refuge) are aesthetically pleasurable at the fundamental level of his experience of landscapes.

The prospect-refuge theory provides a promising theoretical model in which landscapes in diverse media (such as the work of landscape architects and painters and the writing of poets, historians, and philosophers) and in diverse cultural contexts can be analyzed and studied. Yet, to date very little attention has been paid to the validation of such a seemingly promising explanatory model, especially in light of its potential in diverse cultural contexts. This, no doubt, prevents further development and refinement of the theory, and restricts its utility on the practical level. Furthermore, it is generally held that if a theory can not be validated, it has little practical value (Clamp & Powell, 1982). Therefore, the intention of this study is to test the validity of this theoretical model. The objectives of this study are to verify if prospect-refuge is the common symbolic system that underlies how a person experiences landscapes (regardless of the landscape's cultural origin), and to validate if this symbolic system explains and predicts a person's landscape preference.

The prospect-refuge theory makes use of a large assumption: that prospect-refuge aesthetic principle is inherited through generations regardless of historical differences, geographical variations, and cultural dissimilarities. Two considerations have been directed towards validating the theory on this broad assumption. First, to test the theory from the historical point of view, landscape paintings were selected as a medium of

study. The reason for using landscape paintings as a medium of study lies in their advantage of offering a visual spectrum of how the landscapes were perceived in different historical periods. Secondly, to examine the theory from different geographical and cultural aspects, a cross-cultural examination was conducted between Chinese and Western (which broadly include landscape paintings from America and Europe) landscape paintings.

Overall thirty paintings were selected, of which fifteen were Chinese, and fifteen were Western. The paintings were all reproduced as slides for clear display of the images so that they could be viewed by a large number of people at a time. A questionnaire was developed to assess three factors for those paintings: viewers' preference, the degree to which prospect symbolism was depicted in the paintings, and the degree to which refuge symbolism was depicted. Viewers' personal information such as sex, age, educational major and childhood landscape was also included in the last section of the survey to assess their potential influence on the ratings of the three primary factors. The slides, in combination with the questionnaire, were used as a survey instrument. The survey was conducted with Chinese students and spouses at Virginia Tech. There were three reasons for surveying in this particular population. First, previous validation study of prospect-refuge theory by Clamp and Powell (1982) used Americans as subjects. This study was intended to be a comparison with their study. Secondly, to facilitate further exploration of the biological claim of the prospect-refuge theory, this study was intended to examine the theory cross-culturally by asking the participants to assess both Chinese and Western paintings. Thirdly, Chinese students and

spouses were easily accessible to the researcher. A total of fifty students and spouses participated. Responses to questionnaires were quantified and statistically analyzed. Data was used for a series of assessments of the prospect-refuge theory.

II. REVIEW OF LITERATURE

A. Theoretical Development in Landscape Perception

Systematic studies and analyses of landscapes were undertaken in the U.S.A, Great Britain and a number of other countries during the 1960s and the earlier 1970s in response to landscape planning, management and design issues as well as the legislative mandates for environmental quality and protection. In the past three decades, a great variety of disciplines and professions have been involved in this area of study. The diverse interests and scholarly endeavors connected with these studies have generated a considerable amount of research. Approaches from different theoretical backgrounds emerged. These varied approaches include art theory; ecological concepts; stimulus-response behaviorism; signal detection theory; adaptational theories such as "prospect-refuge," "optional stimulus level," and "information processing"; general construct theory; behavior-setting theory; phenomenology; and transactional theory (Zube, Sell and Taylor, 1982). Three major research directions in reference to the implicit and explicit theories embodied within them were identified according to their concentrations on human, landscape, and human-landscape interaction components in the extensive and through review article by Zube, Sell and Taylor (1982).

The first research direction centered on the landscape itself, and was motivated by the pragmatic concerns of environmental management, planning, and design. The main concern of this inquiry was the identification of intrinsic aesthetic qualities or

elements of the landscape that can be stated objectively for use in decision making. Two major approaches to objective categorization of landscape aesthetics were identified in this direction: the expert approach and the non-expert approach. In the expert approach, it is assumed that trained professionals are capable of objectively analyzing scenic beauty and translating landscape qualities into formulas which can be used in design. The conceptual basis for this approach includes the fine arts perspective and the ecological perspective. The fine arts perspective can be seen in such works as Litton (1972) or Laurie (1975), in which the formal artistic qualities--in terms of form, line, color, texture, harmony, and other compositional qualities such as axis and dominance--are translated into assessment of natural beauty. The ecological approach can be seen in Smardon (1975), where there is a strong implicit assumption that a natural, unmodified ecosystem carries the highest value. The results of the expert approach were the development of VRM (visual resource management), LMS (landscape management system), and VIA system (visual impact assessment). The use of non-expert approach drives from the stimulus-response background of experimental psychology which views the environment as a source of stimulus to which the individual responds. It involves assessment through testing the general public's, or a selected population's, evaluations of landscape aesthetic qualities or specific landscape properties. This approach resulted in the development of the procedures of SBE (scenic beauty estimation) and LCJ (law of comparative judgement).

The second research direction focuses on the meaning of the landscape. It involves theoretical approaches, ranging from psychobiological and evolutionary

conceptualization to emphasis on the effects of culture and personality. The major psychobiological approach derives from Berlyne's (1960, 1971) arousal theory in which aesthetic stimulus elements are important because of their biological associations. This can be seen in the works of Wohlwill (1976) and Clynes (1969). An important evolutionary approach has its basis in Appleton's prospect-refuge theory (1975a), and in information processing theory (R. Kaplan, 1979; S. Kaplan, 1975,1979).

The third direction, unlike the above two, which focuses on the objective quality of landscape or the subjective meaning to individuals, centers on the human-landscape interaction. It emphasizes experiences and suggests that aesthetic quality can lie both in the landscape and in the meaning of landscape to people. Much of the study of landscape in this direction grew out of geographers' studies of landscape (Zube, 1970; Meining, 1979) and sense of place (Relph, 1976; Tuan, 1977). The major contribution of this direction has been the understanding of the experience of interacting with the landscape and its importance to people.

Four general paradigms of landscape perception research were synthesized--including expert, psychophysical, cognitive and experiential--in all three directions:

> The expert paradigm involves evaluation of landscape quality by skilled and trained observers. Skills evolve from training in art and design, ecology or in resource management fields. The psychophysical paradigm involves assessment through testing general public or selected population's evaluations of landscape aesthetic qualities or of specific landscape properties. The external landscape properties are assumed to bear a correlational or stimulus-response relationship

> to observers' evaluation and behavior. The cognitive paradigm involves a search for human meaning associated with the landscape or landscape properties. Information is received by human observer and, in conjunction with past experience, future expectation, and socio-cultural conditioning, lends meaning to landscape. The experiential paradigm considers landscape values to be based on the experience of the human-landscape interaction, whereby both are shaping and being shaped by the interactive process. (Zube, Sell & Taylor, 1982)

The above paradigms were more fully developed into three approaches in terms of their theoretical orientations and their potential contribution to the field in Zube's "Themes in Landscape Assessment Theory" (1984). These approaches are professional, behavioral, and humanistic. The professional approach--exemplified by the works of planners, landscape architects, and natural resource managers--draws on principles of visual aesthetics, ecological theory, and biological resource management concepts. The behavioral approach draws on such theories as signal detection, stimulus-response arousal, adaptation level, and information processing. And the humanistic approach, in the work of humanists and cultural geographers, draws on concepts of sense of place, historicism, and phenomenology. According to Zube (1984):

> Each approach is not only defined by disciplines, theories, concepts, and methods, but also by product ranging from verbal and graphic description of landscape in the professional paradigm, to quantitative evaluation and predicative equations of scenic quality in the behavioral approach, and to description of meaning of landscape and the interaction of human and landscape in the humanistic paradigm.

Each approach varies in terms of validity, reliability, utility, and sensitivity (Daniel & Vining, 1983; Porteous, 1982; Zube, 1984). Where the professional approach has been demonstrated to have great utility, it also has low reliability (Feimer et al., 1979). Behavioral approach is subject to rigorous test of validity and reliability based on empirical research methods. The humanistic approach is the most sensitive of all, but lacks validity and reliability, and demonstrated utility (Daniel & Vining, 1983; Porteous, 1982). The conceptual themes underlying those three approaches are normative aesthetic value, biological heritage, and cultural influence.

The biological and cultural themes for landscape perception have also been restated in a number of articles engaged in the search for a theory of landscape aesthetic. Bourassa (1988) in his "Toward a Theory of Landscape Aesthetics," demonstrated that human aesthetic response occurs at both biological and cultural levels based on diverse empirical observations. Supported by Jungian psychology and recent findings in neurophysiology, the article identified Appleton's habitat and prospect-refuge theories as important steps towards the understanding biological aesthetic principle. The cultural aesthetic principle was found in John Costonis' "Cultural identity-stability" hypothesis, which found a basis for aesthetic controls in the desires of groups to protect their identity and cultural stability by exercising control over their environments.

These biological and cultural explanations for the aesthetic behavior were further developed into three modes of aesthetic experiences--biological, cultural, and personal--in Bourassa's recent article "A Paradigm for Landscape Aesthetic" (1990). He built on the work of L.S. Vygotsky in developmental psychology to understand the human mind and

human behavior. Vygotsky's method leads to the identification of three fundamental processes of development: biological evolution, cultural history, and individual development. The tripartite structure of human mental development was proposed to identify three modes of aesthetic experience involving biological laws, cultural rules and personal strategies. The paradigm based on the three modes was suggested to be useful in helping to pose important research questions.

For the past three decades, much of the significant research in landscape perception has been done along the lines of biological heritage and cultural explanation. Bourassa (1990) writes, "The biological basis for behavior is transmitted genetically, through sexual reproduction, whereas the cultural basis for behavior is transmitted socially, through the use of language and other cultural means." This fundamental difference in the developmental origins of the innate and learned behavior suggests that both biology and culture serve as distinct bases for the explanations of the aesthetic behavior.

B. Cultural Perspective in Landscape Perception

A considerable amount of empirical studies in landscape perception support that culture plays a role in shaping humans' perception and values. Within the same culture, age related discrepancies in preferences have been found, with adolescence especially dissimilar from other age groups (Balling & Falk, 1982; Zube et al., 1983). Differences in natural environment preference related to ethnic and/or urban background variables

were also reported (Zube & Pitt, 1981; Schroeder, 1983; Kaplan & Talbot, 1987). Differences attributable to professional background and/or vocational interests related to the environment were found as well (Buhyoff et al., 1978).

Cross-cultural studies offer further evidence of the probable effects of culture on landscape perception. Of these studies, there are three perspectives concerning cultural influence. One group presents evidence that culture is the preeminent determinant of preference (Lowenthal, 1968; Sonnenfeld, 1967; Tuan, 1973; Zube & Pitt, 1981). Differences in perceived landscape values have been found when there were significant differences between cultures. Sonnenfeld found strong differences in preferences between Eskimos and Americans. Zube and Pitt (1981) reported that there were relatively low correlations in scenic quality ratings between West Indians and Americans. Another group has shown relatively high agreement when cultures are fairly similar (Zube, 1984), such as between Scots and Americans (Shafer & Toobey, 1973) and Australians and Americans (Zube & Mills, 1976). Ulrich reported similar findings with high rank-order correlation between Swedish and American rating (Ulrich, 1977). A third group of studies have shown that both similarities and differences in landscape preference were found across cultures (Kaplan & Herbert, 1987).

While culture remains a significant account of landscape perception in those studies, according to Midgley (1978, p.286), "Culture is not an alternative or replacement for instinct, but its outgrowth and supplement." This suggests that "humans remain biological creatures even as they develop highly sophisticated cultures" (Bourassa, 1990).

C. Biological Perspective in Landscape Perception

Much of the significant theoretical research in landscape perception has been built upon biological bases. "The biological theme suggests that landscape perception is shaped in part by our biological heritage and is exemplified by the work of Appleton, Kaplan, and Balling and Falk" (Zube, 1984). Similar views of landscape aesthetics can also be found in the works of biologists (Dubos 1980; Iltis et al., 1972), geographers (Tuan, 1974), psychiatrists (Stainbrook, 1969), landscape designers (Colvin, 1970; Greenbie 1981), and urban designers (Sitte, 1889).

Kaplan's information processing theory (1982) is based on an evolutionary concept. Its empirical research has been developed to define relationships between the information content of landscapes and findings about the landscape preference. The theory proposes that long term survival of the human species is dependent upon the development of cognitive information processing skills, which in turn lead to preferences for landscapes that make sense to the observer. In other words, the landscapes that are preferred are those which can be comprehended, where information can be obtained relatively easily in a non-threatening manner that provides opportunity for involvement and conveys the prospect for additional information. According to this theory, preferred landscapes are coherent, legible, complex, and mysterious.

Balling and Falk's Savanna theory (1982) hypothesized that there is an innate preference for the savanna type landscape and that this preference is modified over time by environmental experiences. They hypothesized that a preference for savanna landscape might be a part of human biological heritage because of the relative safety and

the availability of food found in such landscapes by our earliest ancestors. Furthermore, that preference most likely would be revealed in younger children. "A savanna landscape and a landscape that is coherent, legible, complex and mysterious, both evoke a similar image--an image of a landscape of interspersed openings and wooded area" (Zube, 1984). This is the type of landscape which is also envisioned in the prospect-refuge hypothesis.

Appleton's Prospect-refuge theory was the first major attempt to establish a theory of landscape aesthetics. The theory relates the idea of landscape preference to a typology of landscape through the medium of the biological, and more particularly, the behavioral sciences. It is an important step toward identifying a biological base for aesthetic behavior. Relying heavily on Dewey's assertion that man obtains aesthetic pleasure from the satisfaction of basic drives, Appleton argues that the environmental implication of these basic drives are fundamentally the same for both man and animals. He proposes:

> ...that aesthetic satisfaction, experienced in the contemplation of landscape, stems from the spontaneous perception of landscape features which, in their shapes, colors, spatial arrangement and other visual attributes, act as sign-stimuli indicative of environmental conditions favorable to survival, whether they really are favorable or not. (1975a, p.69)

This proposition was called habitat theory. Based on habitat theory, Appleton further develops his argument by stressing the importance of "the ability to see without being seen"; he labeled this portion of the thesis "prospect-refuge theory." The relationship between habitat theory and prospect-refuge theory is outlined as follows:

> ...habitat theory postulates that aesthetic pleasure in landscape derives from the

> observer experiencing an environment favorable to the satisfaction of his biological needs. Prospect-refuge theory postulates that, because the ability to see without being seen is an intermediate step in the satisfaction of many of those needs, the capacity of an environment to ensure the achievement of this becomes a more immediate source of aesthetic satisfaction. (1975a, p.73)

In other words, landscape that provide humans with opportunities to see (prospect) and places to hide (refuge) provide aesthetic pleasure because they contribute to the satisfaction of the observer's biological needs. One way in which prospect can be perceived is the visibility in landscapes. The more open the landscape, the stronger the prospect. And one way in which refuge can be perceived is the presence of vegetation, the presence of man-made structures such as houses and ships, and the sense of enclosure present in the landscape.

This theory attempts to identify primitive patterns of behavior--particularly perception--as the origins from which the highly complex preference patterns of humans have grown. It provides a promising explanatory model in which landscape under diverse media and in diverse cultural contexts can be analyzed and studied. For examples, Petrus C. Heyligers (1981) in his paper on dune landscapes of south Australia concluded that the prospect and refuge symbolic system was applicable at various levels of abstraction. In a review essay, Paulson (1976-77) employed prospect-refuge theory in the explanation of his new interpretation of the paintings of Constable, and repeated and expanded it in his later work as well (Paulson, 1982). However, only limited testing of its validity has been attempted for this theory. The only direct testing of the

hypothesis was carried out by Clamp and Powell (1982). They set out to test the theory by taking four questions and subjecting them to the assessment of four judges. These questions tested 1) uniformity/variability of the response, 2) validity of prospect, refuge and hazard, and the balance between them as the prediction of the judged landscape quality, 3) applicability to landscape not merely as perceived from a particular viewpoint, and 4) the relative significance of prospect, refuge and hazard. Apart from establishing a majority preference for prospect-dominant landscapes, Clamp and Powell's test failed "either to support conclusively or to negate the central claim of prospect-refuge theory" (Clamp & Powell, 1982). Yet, since only four subjects participated in the study, a great deal of caution has to be taken when interpreting the findings. Another study in which an attempt was made to introduce prospect-refuge theory into landscape evaluation was undertaken by David Woodcock (1982) at the University of Michigan. No empirical support was found for the hypothetical correlations between preferred landscapes and the symbolism of prospect, refuge and hazard, yet, "there were others in which very clear patterns began to emerge" (Appleton, 1984).

Nevertheless, before the utility of this conceptual theory can be determined and expanded empirically, additional validation research is obviously necessary. This study is intended to test the validity of the theory from both historical and cross-cultural perspectives. The primary aims are to validate the existence of prospect and refuge in landscapes regardless of the cultural dissimilarities, historical differences, and geographical variations, and to validate the predictability of the prospect-refuge symbolic system to landscape preference. Attention is also given to the possible cultural influence

in the varying symbolism of prospect and refuge.

III. METHODOLOGY

Prospect-refuge theory postulates that landscapes with prospect and refuge are aesthetically pleasurable because they satisfy humans' survival needs. The broad assumption which the theory implies is that prospect-refuge aesthetic principle is inherited through generations regardless of three criteria: historical differences, geographical variations, and cultural dissimilarities. The previous validation study on prospect-refuge theory by Clamp and Powell (1982) used a photographic survey of American landscapes; the results neither supported nor negated the theory. Their study had geographical and cultural limitations, and it did not reveal the historical aspects of humans' landscape perception, on which the theory places high emphasis. In this study, all three criteria were therefore taken into consideration.

From the historical perspective, landscape paintings were adopted as a medium of study because they offer a visual record of how landscapes are perceived in different historical periods, and thus are more reliable to study, for example, than literary accounts. From the geographical and cultural perspective, Chinese and Western cultures were targeted due to their geographical and cultural make up. Geographically, China and Western countries are distinctly different. Culturally, both Chinese and Western cultures have their own unique religions, history, social values and social norms. To validate the biological claim of the prospect-refuge theory, the analyses of landscapes from different geographical and cultural contexts are crucial. Therefore, historical landscape paintings were selected from both Chinese and Western cultures.

In order to gather the largest number of people's evaluations about landscape paintings within the allowance of research time, a survey technique was adopted as a study method. There were two reasons. First, surveys are widely used in landscape perception studies and are assumed to have a certain degree of reliability. Secondly, surveys make it possible to study a large number of people than would have been possible with an interview format. It was also assumed that the return rate of mailed questionnaires would be very low. Therefore, an in-room survey in combination with a slide presentation was used.

The paintings were all made into slides, because slides have several advantages over prints of paintings. They can be viewed by a large number of people at a time (reducing the questionnaire administration time); and they also can be projected at a larger scale to display the painting-images more clearly.

Coupled with the slides, a survey questionnaire was developed. To validate the central claim of the theory that landscapes with prospect and refuge are aesthetically pleasurable, the questionnaire was geared to assess three primary factors for the selected landscape paintings. These factors were viewers' preference, the degree to which prospect was depicted in the paintings, and the degree to which refuge was depicted as well. The objectives were to assess the existence of the prospect-refuge symbolic system in the paintings and its predictability to the preference ratings of the paintings. If the theory proves valid, both prospect and refuge should be present in the paintings and recognizable by the viewers. Furthermore, the preference ratings of the paintings could be predicted by the degree of the prospect-refuge symbolic system depicted in the

paintings.

Previous landscape perception studies have found that sex (Nasar, et al., 1983), age (Zube, et al., 1983), professional background (Buhyoff, et al., 1978), and childhood landscapes (Hampe, et al., 1974) contribute to a person's preference for a particular landscape. To further validate those studies and, more importantly, to validate the biological claim of prospect-refuge theory, the questionnaire also asked for personal information from the study participants. The questionnaire asked for sex, age, educational major, and childhood landscapes of the participant. If the theory is based on humans' survival nature, both prospect and refuge would be recognizable regardless of the differences in age, sex, educational major, and childhood landscapes.

Studies by Clamp and Powell (1982) and Woodcock (1982) utilized American subjects to assess American landscapes. These studies were limited in their exploration of the biological claim for prospect-refuge theory. To overcome this limitation, the present study employed a cross-cultural examination. The study was accomplished by a survey of Chinese students and scholars at Virginia Tech. The participants were asked to assess three factors for both Chinese and Western paintings. If prospect-refuge is biologically related, the participants would be expected to recognize the symbolic system in both Chinese and Western paintings.

To elevate the study method beyond the level of unreliable word description, survey data was quantified and statistically assessed. Descriptive statistics, Anova, paired t-test and multiple regression were all utilized for the analysis and interpretation of the data.

The details for painting and participant selection, the questionnaire developed to validate the theory, and the process to conduct the survey are all described in greater detail below. The methods and procedures used to analyze and interpret data are also examined in the following sections.

A. Painting Selection

There were two general guidelines for selecting paintings from both Chinese and Western cultures. First, to validate that prospect-refuge is a common symbolic system present in landscape paintings, the consideration was to select paintings representative of different historical periods and diverse painting styles. Secondly, to test the cultural influence and possible variation of prospect-refuge symbolism, paintings needed to be representative of the landscape art in that culture.

Chinese landscape painting was firmly established in the Song Dynasty (Capon & Pang, 1981, p. 8). Since then, a variety of painting styles and schools have evolved, including the Northern Song sublime landscape painting, the expressionistic literati painting of the South Song Dynasty, the academic painting (or Court painting), and others. In the following centuries, landscape paintings remained both an expressionistic tool for depicting man's relationship with the natural environment as well as for aesthetic expression toward nature, until the mid-nineteenth century when China was defeated in the Opium War. Subsequently, great impact came from the West and resulted enormous political, social, economical, and cultural changes in China. Art was no exception. New ideas, new techniques, and new painting media brought new art forms and styles into

being and greatly changed the traditional art field. To make sure that the selected paintings represented the truly traditional paintings for this study, Chinese landscape art after the 19th century was not included. Paintings were selected from the period between the 11th century (when landscape paintings were firmly established in China) and the late 18th century (before the Western impact). In essence, paintings from this period represent the true traditional Chinese landscape art.

Landscape studies in the West emerged during the Italian Renaissance (the late 14th century to the early 15th century). In the following centuries, distinct landscape painting styles evolved. The major landscape painting schools include the 17th century Dutch, the 18th century French, the 19th century English, and the 19th century American Hudson River schools. For this study, Western landscape paintings were largely selected from these major schools, spanning the time period from the late 16th century to the late 19th century.

After deciding the period from which to select the paintings, landscape paintings were chosen from art history books. There were two criteria for selecting individual paintings. First, paintings with strong cultural identities and symbols (including salient man-made structures and human figures) were not included. Secondly, to reflect historically how landscapes were perceived, the paintings selected were to represent various historical periods and diverse painting styles. The selected paintings were predominantly of natural landscapes, thus the study was essentially based on the natural landscape elements. However, a few of the paintings contained (in small scale) human figures, animals, ships, and houses, because there were no paintings available to

represent that particular time period. The paintings were photographed into slides using indoor photographic facilities. A blue filter was used to scan the yellow light to better represent the paintings. The slides were then inspected again to eliminate those with light or fuzzy images.

Finally, forty-four paintings were chosen for the study; half were Chinese and the other half were Western. The Chinese paintings spanned a period of more than 700 years and were completed by 19 painters. The Western paintings were selected from a 300 year period and were from 18 individual painters. The paintings were believed to represent diverse historical periods and painting styles and revealed historically landscape perception for both cultures in the media of landscape paintings.

B. Questionnaire Development

To validate that landscapes with prospect and refuge are aesthetically pleasurable, a survey in combination with a slide presentation was used to test the selected population's evaluations of the landscape paintings. The questionnaire was developed to assess three factors for the selected paintings. These factors were viewers' preference, the degree to which prospect symbolism was depicted in the paintings, and the degree to which refuge symbolism was depicted as well. The objectives were used to validate the existence of the prospect-refuge symbolic system in the landscape paintings, and its use in predicting the preference ratings of those paintings. Participants' personal information was also gathered in the questionnaire to further validate the biological claim of the theory.

The questionnaire had four parts (Appendix II):

1. Preference rating
2. Prospect rating
3. Refuge rating
4. Personal information

For the first three parts, the ratings were based on a 5-point categorical scale. This scale was chosen because it was "easily understood and used by participants" (Miller, 1984) and also widely used in other landscape perception research.

The first part was preference rating. Preference was defined as "how much or to what degree a person likes a landscape in the painting". The 1 to 5 scale represented categorically: 1=do not like; 2=like somewhat; 3=moderately like; 4=like; 5=like very much. It was followed by prospect rating. The definition for prospect was that "a sense of prospect is present when the landscape appears to provide extensive and commanding views which promise to provide a greater understanding of the surrounding landscape". The third part was refuge rating. Refuge was defined as "a sense of refuge is present when the landscape appears to provide potential for giving shelters, protection or aid from trouble, danger or pursuit". The categorical scale used for prospect and refuge was the same, with 1=not present, 2=slightly present, 3=moderately present, 4=strongly present, and 5=very strongly present. Preference was rated before prospect and refuge ratings to avoid the potential influences of prospect and refuge ratings on it.

The fourth and last part of the questionnaire asked the participants to fill out their personal information, including age, sex, educational major, and participants' childhood

landscapes. Childhood landscapes were further divided into settlement pattern, topography, and predominant vegetation. These three categories were once again broken down into subcategories (according to the background of the participants that this study was going to target). Settlement pattern was subdivided into village, small town, and city, which are the basic settlement patterns in China. Topography was subdivided into flat, rolling hills, and mountainous, which are the typical topographical categorizations used in China. Vegetation had six subcategories: desert, grass land, mostly deciduous trees, mostly conifer trees, mixture of deciduous and conifer trees, and other. Since China has such a large territory, there exists great geographical and meteorological variations, which causes vegetative diversity. All the personal information variables were used to help validate the biological claim of the theory. If the theory is based on humans' biological nature, prospect-refuge aesthetic should be recognizable regardless of the differences in age, sex, educational major, and childhood landscapes.

C. Study Participants

The study was accomplished by a survey of Chinese students and scholars at Virginia Tech. There are three reasons for selecting this particular population to study. First, studies by Clamp and Powell (1982) and Woodcock (1982) both were participated by American. This study was intended to be a comparison. Secondly, to facilitate further exploration of the biological claim of the prospect-refuge theory, this study was intended to examine the theory cross-culturally. The participants were asked to assess both Chinese and Western paintings. If the theory is biologically based, the participants

would be expected to recognize the prospect-refuge symbolic system in both Chinese and Western paintings. Thirdly, this particular population was relatively easy for the researcher to access.

Participants were all listed in The Association of Chinese Students & Scholars Telephone Book and were contacted randomly following the phone list. They were briefly told that this study was about landscape preference and that it was intended to enhance landscape architects' knowledge about landscape preference through studying landscape paintings and that they were asked to score some paintings based on their own judgement. Except for a few who were away during the summer, a majority of the students and spouses contacted were interested in seeing paintings and were willing to participate the survey. Overall, 50 students and spouses took part, with students accounting for 86% and spouses 14% of the study participants.

Table 1 lists the personal information for the 50 participants. Of the 50 participants, 31 were males, 19 were females. A great amount of gender difference existed. However, this seemed to reflect the actual male-female ratio of the particular population as well as the student population in China as a whole. In China, due to the high competitiveness of national college entry examinations, females are a minority already in undergraduate study. And at the graduate level, even fewer female students enroll. That is basically the case in this study population. This study population is comprised of students and scholars, the majority of whom are here for their graduate education. Therefore, the number of female students is very limited. To balance the gender differences, spouses (wives) were thus included as study participants. Still,

gender appeared as an uneven distribution, which could possibly result in biases in the statistical comparison in terms of gender.

Participants' age was categorized into five groups: 20 and under; 21-25; 26-30; 31-35; 36 or greater. They were so categorized because the study population was students and scholars, so it was assumed that these categories were ample enough to reflect the range of age. The data seemed to be the case. 78% (39) of the participants were between the ages of 21 and 35, nine were above the age of 36, and only two participants were under the age of 20.

Childhood landscapes were divided into settlement pattern, topography, and dominant vegetation. The settlement pattern information received showed that six participants spent most of their childhood in villages, 12 in small towns, and 32 in cities. This seems consistent with knowledge about China's education system; in China, education in rural areas is much poorer than that in urban areas, even though the college entry examination is standard across the country. This has put high school graduates from rural area in a less competitive position in the examination. As a result, the majority of the college students are from cities, some from small towns, and a very few from rural areas. The population that this study targeted is among the most highly educated in China. Therefore, as reflected in their personal background information (Table 1), 63% of the participants grew up in a city, 24% in a small town, only 12% in a village. Again there was an uneven distribution of the participants among the three categories.

Table 1. Study participants.

Sex	Male	31	62%
	Female	19	38%
Age	20<	2	4%
	21-25	6	12%
	26-30	21	42%
	31-35	12	24%
	36>	9	18%
Childhood Landscapes			
A. Settlement pattern			
	Village	6	12%
	Small town	12	24%
	City	32	64%
B. Topography			
	Mountainous	7	14%
	Rolling hills	13	26%
	Flat	30	60%
C. Dominant vegetation			
	Desert	0	0%
	Grass land	2	4%
	Mostly deciduous trees	13	26%
	Mostly conifer trees	1	2%
	Mixture of d and c * trees	32	64%
	other	2	4%

* d =deciduous, c=conifer

In the topography category, seven participants spent their childhood in a mountainous area, 13 in rolling hills, 30 in flat terrain. This topography information basically reflects the settlement patterns of the participants. In China, villages are normally scattered in mountainous terrain, cities are usually situated in flat areas, and small towns are in between flat and mountainous terrains. Corresponding with the data of settlement pattern, therefore, 66% of the participants grew up in flat terrain, 26% in rolling hills, only 14% in mountainous areas.

China is a country with vast territory and great vegetation variations. This study divided it into 6 categories: desert, grass land, mostly deciduous trees, mostly conifer trees, mixture of deciduous and conifer trees, and other. The data showed that no participants grew up in desert; only one in mostly conifer vegetative areas; two in grass land; two in other; 32 in a mixture of deciduous and conifer vegetative area; 13 in mostly deciduous area. This information also corresponded with the settlement pattern and topography data. Although China is vast in its territory, the population has always been condensed in certain areas where the climate is warm, the elevation is low, and the topography is relatively flat. Those areas are usually rich in vegetation, and both deciduous and conifer trees grow well. This general trend was reflected in the study population, thus 90% of the population spent their childhood in such vegetative areas.

Table 2 lists educational majors of the participants. Since one participant left this category blank, of the 49 participants, there were 26 majors identified, indicating great diversities in participants' educational background in terms of major.

Table 2. List of the participants majors

Accounting	1
Agricultural engineering	2
Architecture	1
Biology	2
Crops, soil environmental engineering	2
Chemistry	4
Chemical engineering	1
Civil engineering	3
Computer science	2
Economy	1
Electrical engineering	6
Fiber optics	1
Horticulture	2
Landscape architecture	2
Law	1
Mathematics	2
Medicine	1
Mechanical engineering	5
Public management	1
Physics	1
Psychology	1
Statistics	2
Tourism	1
Vet medicine	2
Urban planning	1
Wildlife	1
(Blank)	1

D. Survey Procedure

To gather the largest number of public evaluations of the landscape paintings within the allowance of the research time, this study adopted an in-room survey in combination with a slide presentation.

Preparation of the slides for the presentation

In order to give the participants a clear understanding of the range of the 5-point categorical scale for prospect ratings, five slides were chosen out of the 44 slides as examples to show the categorical range (Appendix III, P1 to P5). The same thing was done for refuge (Appendix III, R1 to R5). Altogether, ten slides were selected as examples.

To help the participants become familiar with the rating task, another four slides were used as warm-up slides. These four slides were put in the beginning of the slide tray. Data collected from those four slides were not included in the analyses of the results.

There were 30 slides (15 Chinese, 15 western) left. They were mixed on a table, and numbered from 1 to 30. Then the numbered slides were put into the slide tray according to a random digit table and readied for the survey.

Pre-test

Before the actual survey for the study, a pre-test was conducted for two persons. The pre-test helped to determine the clarity of the survey instruction and the appropriate viewing time spans for the slides. Data from the pre-test were not included in the final analyses of the results.

Survey sessions

Because it was not possible to call all of the participants together at one time, the survey was accomplished in several sessions. The number of participants for each session varied, from the minimum of one to the maximum of eight. The majority of these sessions had from three to five participants. To minimize the influence of the survey instruction as much as possible, a standardized written instruction was handed out to every participant before the rating began (Appendix I). The instruction briefly explained what the study was about, what its significance was, and how the study was to be conducted. Since it was written in English, to avoid misunderstanding caused by language, an oral translation was read aloud in Chinese. The oral translation was also written down in order to standardize it through all the sessions.

To avoid any influence from varying room condition, such as the distance in projecting the images, seating, noise, and light, all sessions were conducted in the same room (105A, architecture annex on the campus of VPI). Since all the sessions were conducted in the same room, the possible influence of the comfort of the seating on the rating task was assumed to be balanced. The painting-images were projected approximately at the same distance for all the sessions. However, there were some differences in light conditions among the different sessions, because some of the sessions were conducted in daytime, some in the early evening. Daytime sessions were exposed to more light than the evening ones. Yet, since the survey was accomplished through many sessions (both daytime and evening), the influence of light conditions was assumed to be balanced in the end. Since the survey was undertaken during the summer when

the school was in recess, the building where the survey was conducted was quiet during both the day and evening; thus, the noise influence on ratings was assumed to be minor also.

Rating procedure

The survey was in undertaken in combination with a slide presentation. It included three rating questions and a personal information section at the end.

The rating started with preference. The participants were asked to rate the paintings in terms of how they liked the landscapes depicted rather than how skillful that they thought the paintings were painted. Slides were scored one at a time. The viewing time was approximately 8 seconds per slide. The slide's number was called out for every fifth slide to avoid mistakes in circling the rating scale. Overall 34 slides were rated.

The second part was prospect rating. Before the rating started, a definition of prospect was read aloud. Then participants were shown 5 slides as examples in accordance with the 1-5 categorical scale. The same 34 slides were then rated for their degree of prospect symbolism. In the third part of the ratings, the same procedure as the prospect rating was followed to rate refuge for the same 34 slides.

After finishing all the above ratings, participants were asked to fill out their personal information.

The time required per survey session was approximately 35 minutes.

Other external factors

To avoid external variables such as unfamiliarity at the beginning of the rating or rushing through at the end of rating, the questionnaire was designed to be marked with

38 slides. The actual rating was done for 34 slides. The first four slides were used to give the participants familiarity with the task, so these data were not used in the analysis. The last four numbers on the questionnaire sheets were not circled since there were no slides for them. They were only present to avoid the anticipation at the end of the rating task and the possible influence of rushing through in the rating of the last few slides.

To avoid the slide sequence effect on ratings, the 30 slides used for the study were reordered three times according to the random digit table, and each order was rated approximately by an equal number of the participants of the survey.

E. Data Analysis Methods

To elevate the study method beyond the level of unreliable word description, besides the rating data, participants' personal information was also quantified. A statistical approach was adopted to analyze, describe, and interpret the survey data. Several different statistical methods were used.

To validate the existence of prospect and refuge in the selected paintings, simple one tailed t-tests were used. They were used to test the overall means of both prospect and refuge of the 30 paintings larger than two, indicating somewhat presence of prospect and refuge. After that, nonparametric correlation tests were conducted to examine if there were any relationships between preference and prospect and refuge. Following that, multiple regression tests were conducted to test the predictability of the prospect-refuge symbolic system to preference. Then, multiple analysis of variance were followed to see if there were any differences in the rating of preference, prospect, and refuge

between and/or among various groups (age, sex. educational major, and childhood landscape). Finally, to study if any variation existed in depicting the symbolism of prospect and refuge between Chinese and Western cultures, a paired t-test was conducted.

In summary, this study was developed as an attempt to validate the prospect-refuge theory. The methodology chosen to collect information--including landscape paintings of Chinese and Western cultures from different historical periods, the survey through a slide presentation, cross-cultural examination by choosing Chinese students and spouses as study participants--all allowed the collection of a wide range of information, and made it possible to validate the theory in both historical and cross-cultural perspectives. Through data quantification, the computerized statistical procedures were able to do multi-level description and analyses of the data. This elevated the research method beyond the level of unreliable word description.

IV. RESULTS

This study was developed to validate 1) if prospect and refuge which are assumed to be based on "to see without being seen" were present in Chinese and Western landscape paintings in different historical periods and 2) if the degree of the presence of prospect and refuge affected the degree of people's preference towards the paintings.

After the paintings were made into slides, this study used a survey technique in combination with a slide presentation to collect the ratings of three factors (preference, prospect, refuge) for the 30 paintings according to 50 Chinese students and spouses at Virginia Tech. In addition, the survey also gathered data of the participants background (sex, age, major, childhood landscapes) to assess their possible influences on landscape preference and the perception of prospect and refuge.

Through the statistical approach, the data collected were utilized to conduct a series of assessments of the factors and to proceed upon a systematic examination of the prospect-refuge theory.

A. The Assessment of Prospect

Prospect symbolism is based on the basic behavior "to see." To adapt an environment better, an open landscape provides a wide visibility, which helps the observer obtain landscape information and increase his understanding of the landscape; thus, he would have a better chance to survive. As a result, that landscape becomes

strong in its prospect imagery to the observer.

This section, through prospect rating, examined whether prospect symbolism was depicted in the selected paintings, and to what degree it was depicted. The aim was to generate an understanding of the hypothetical relationship between prospect and preference.

Fifty participants scored prospect for each of the 30 paintings. Table 3 reports the means and the standard deviations for each of the painting. In a 5-point categorical scale, the means for the paintings ranged from a low of 1.44 to a high of 4.52. This was interpreted that the prospect symbolism varied from "very weak/none" to "strong/very strong" in the paintings.

To examine whether prospect exists overall in the selected paintings, a simple one-tailed t-test was conducted. It was used to test the overall mean score for the 30 paintings equal to or larger than 2 (indicating a slight presence of prospect). The simple one tailed test was H_o: mean$=2$ vs H_a: mean>2. The overall mean score was 2.82. The test result significantly ($\alpha=0.10$) indicated the presence of prospect in the selected paintings.

Since prospect was indicated to be present, the next step was to examine to what extent it was present. Prospect mean frequency distribution was examined. The distribution was found to be skewed slightly to the lower end of the rating scale. It suggested that overall the symbolism of prospect did not show strong presence in the selected paintings.

An analysis was further extended to see how the responses of prospect varied

Table 3. Means and Standard deviations of preference, prospect and refuge of the 30 paintings.

A. Chinese Paintings

# of Paintings	Preference		Prospect		Refuge	
	Mean	Stdev	Mean	Stdev	Mean	Stdev
1	3.40	1.10	2.60	1.51	3.00	1.41
3	3.62	.96	2.34	.96	3.46	1.11
4	3.28	1.13	3.28	1.29	2.48	1.22
9	3.52	.97	3.38	.88	2.98	.92
12	3.38	1.31	1.84	.74	4.30	.98
13	3.66	1.12	2.98	1.21	2.78	1.24
14	3.84	.96	2.08	.69	4.38	.88
15	3.64	.92	1.96	.67	3.58	1.03
17	3.78	.95	1.98	.79	3.52	1.04
18	3.60	1.09	2.30	.99	4.04	1.07
19	4.10	1.02	3.08	.78	3.16	.89
22	3.44	1.23	2.72	.93	3.54	1.09
24	3.80	1.07	1.44	.58	4.50	.98
27	2.84	1.09	2.22	1.36	3.54	1.48
29	3.66	.94	2.90	.82	3.04	.99

B. Western Paintings

# of Paintings	Preference		Prospect		Refuge	
	Mean	Stdev	Mean	Stdev	Mean	Stdev
2	4.20	.88	2.18	.89	3.92	1.19
5	3.32	1.05	3.76	1.24	2.10	1.33
6	4.44	.91	2.98	.85	3.10	.74
7	3.34	1.00	2.54	.97	2.96	.95
8	4.16	.98	2.28	.99	3.80	.99
10	3.68	.99	4.52	.54	1.52	.51
11	3.96	1.07	3.12	.98	2.82	1.06
16	3.06	1.04	3.64	.94	2.50	1.04
20	3.20	1.11	2.60	1.07	3.70	1.28
21	3.08	1.05	2.26	.80	3.40	.86
23	3.52	.99	2.58	.93	3.90	1.16
26	3.94	1.15	4.06	.74	2.02	.69
28	3.24	.98	3.96	.86	1.90	.87
30	3.68	.99	3.08	.85	2.94	.96

among the participants. Figure 1 showed the prospect score for each of the 30 paintings plotted against the relevant standard deviation of that score. A definite pattern emerged, with a smaller standard deviation as the mean prospect score got either higher or lower. This suggested that there was a higher agreement of prospect in the two ends of the rating scale. Paintings in the middle range had larger standard deviation and exhibited more disagreement in prospect rating.

Paintings at the two end of the prospect rating scale were then examined to ascertain their salient landscape features. It was to see what made them so distinct from each other. Paintings with high prospect scores were #10, #26, #23, #28, #5, #16 (Appendix IV). The commonality of these paintings was their strongly horizontal landform. Landscapes were open, flat, and had extensive visibility. Vegetation was sparse or illegible. The scene compositions were dominated by the presence of the sky. Paintings with low prospect scores were #24, #12, #15, #17, #14, #2 (Appendix IV). Contrary to those with high prospect scores, those with low scores had common characteristics of strongly vertical landform. Landscapes were the combination of steep mountains with narrow and deep valleys. Views into landscapes were largely blocked by vertical elements such as mountains or vegetation and had to pierce through. There was a clear presence of vegetation.

The assessments of prospect concluded that the prospect symbolism was present in the selected landscape paintings, but, overall, the symbolism was not strong. The examination of the paintings with high prospect scores and those with low scores (or none) showed a clear dichotomy. Paintings with high prospect depicted landscapes that

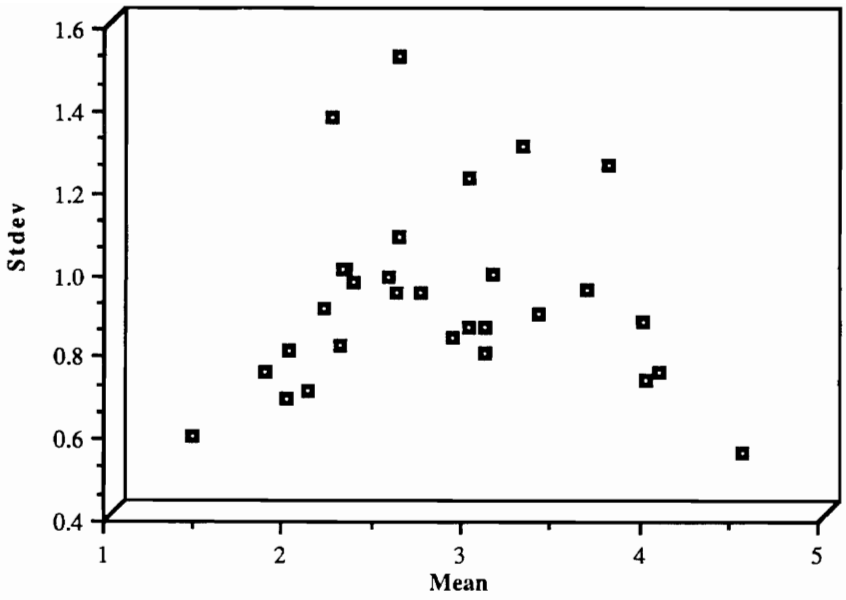


Figure 1. Prospect agreement pattern.

Scatter plot of the mean prospect scores against the relevant standard deviations of the 30 paintings.

were flat, open and had strong horizontal orientation. Paintings with low prospect depicted landscapes that had strong vertical orientation. Landscapes were mountains and valleys. They were steep, narrow, and had limited visibility.

B. The Assessment of Refuge

Refuge is derived from the behavior to hide or to escape--"without being seen." In combination with "to see," according to many behavioral scientists, they comprise two of the basic behaviors in humans' environmental adaptation. "To see" is to obtain information and to know the environment better; "to hide" is to protect oneself from various hazards, dangers and pursuit in the environment. For instance, hiding in a cave from the darkness or the coldness, hiding under a tree from the hot sun or the heavy rain are both examples of refuge. Generally, the more places to hide or refuges, the more chances to survive in the environment. Therefore, the better one is able to survive, the more one would like that environment. Prospect-refuge theory suggests that this fundamental relationship between humans and the environment explain humans' landscape preference.

Through refuge rating, this section examined if refuge symbolism was present in the paintings, and to what extent it was present. The aim was to generate an understanding of the hypothetical relationship between refuge and preference.

Fifty participants scored the refuge for each of the 30 paintings. The mean scores and the standard deviations were also reported in Table 3. In a 5-point scale, the scores ranged from a low of 1.52 to a high of 4.50. This suggested that the refuge symbolism

in the paintings ranged from "very weak/ none" to " strong/very strong."

To examine whether refuge was present overall in the paintings, a simple one-tailed t-test was conducted as it was done for prospect. It was to test the overall mean score of refuge for the 30 paintings equal to or larger than 2 (indicating slight presence of refuge). The simple one-tailed t-test was H_o: mean=2 vs H_a: mean>2. The overall mean was 3.19. The result significantly (α=0.10) indicated the presence of refuge in the selected paintings.

Since refuge was found to be present, the next step was to examine to what extent it was generally present. A mean frequency distribution of refuge for the 30 paintings was examined. On the contrary to the prospect distribution, the distribution of refuge was found to be skewed to the upper end of the scale. This suggested that the refuge symbolism showed a general strong presence in the scenes of paintings.

A further step in the analysis was to examine the uniformity or the variability of the responses among the participants in refuge ratings. This was done through a scatter plot. Figure 2 plotted the mean refuge score for each of the 30 paintings and the relevant standard deviation of that score. The plot did not show any pattern. This seemed to indicate that there were different opinions as to how strong and/or weak a painting was in its refuge symbolism. However, there were still two ends among the 30 paintings in terms of their mean refuge scores.

A content examination was then conducted for the paintings with high refuge scores and those with low scores. It was to see if there were any patterns to explain what made some paintings strongly refuge oriented and vice versa. Paintings with high

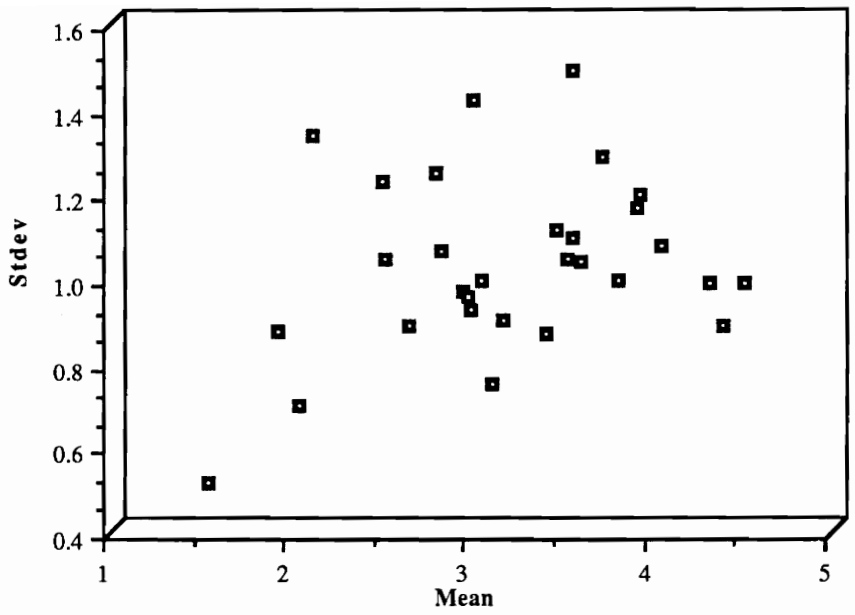


Figure 2. Refuge agreement pattern.

Scatter plot of the mean refuge score against the relevant standard deviations of the 30 paintings.

refuge scores were #24, #14, #12, #18, #2, #25, #8, #20 (Appendix IV). There were some common characteristics of these paintings (except #20). They were all mountainous landscapes with a strong sense of enclosure. The visibility in the landscapes was limited or strongly framed by vertical elements such landform or vegetation. There was clear presence of vegetation. Paintings #24, #14, #12, and #18 also displays signs of building structures shaded by vegetation, which further strengthened the refuge symbolism. Contrary to prospect dominant scenes, refuge dominant scenes presented limited amount of sky. Painting #20 was an exception in refuge rating. The landscape was dominated by a cave in the foreground, which literally symbolized the sense of refuge. Paintings with low refuge scores were #10, #28, #26, #5, #4, #16 (Appendix IV). Their commonality was strongly horizontal landform. Landscapes were open and flat. There was extensive visibility within or into the landscapes. Vegetation was sparse (except #26) or illegible.

The assessments of refuge concluded that refuge symbolism was found to be present overall in the selected paintings. The examinations of the paintings with high refuge scores and those with low scores showed a surprising reverse. Paintings with high refuge scores depicted enclosed mountainous landscapes with limited or framed views. There was clear presence of vegetation. On the other hand, paintings with low scores depicted flat and open landscapes. There was wide visibility.

Interestingly, after examinations of prospect and refuge for these paintings, it seemed that paintings tended to depict more refuge symbolism (3.19) than prospect symbolism (2.82). Moreover, a reductive relationship started to emerge between refuge

and prospect. High refuge landscapes tended to be low in prospect; low refuge landscapes tended to be high in prospect.

C. Relationship between Prospect and Refuge

In the above assessments of prospect and refuge, a reductive relationship was observed between them. To verify their relationship, both simple correlation and multiple regression tests were conducted.

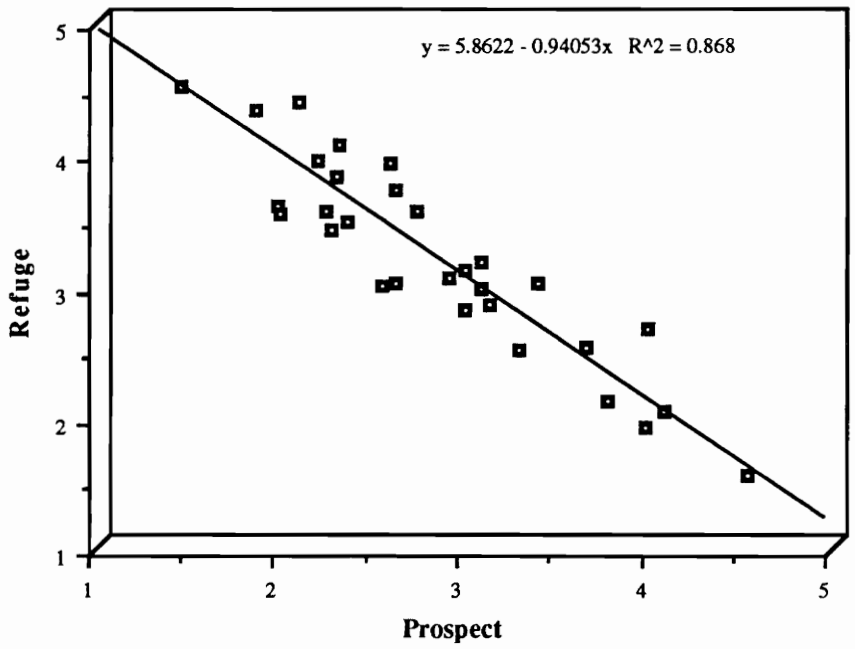
Table 4 summarized the results of the simple correlation tests. The pearson r generated a -0.92 correlation coefficient between prospect and refuge for the 30 paintings. The strong negative relationship was further verified in the two individual painting groups. The correlation between the two symbolisms in Chinese paintings was -0.86, in Western paintings -0.93. The simple correlation tests significantly (α=0.01) indicated the linear negative relationship between prospect and refuge in the paintings.

The multiple regression test further confirmed the results of the simple correlation tests. The results from the multiple regression test had r^2 of 0.847 (α=0.05). This was interpreted to mean that approximately 85% of the variation in mean prospect ratings could be explained by the variation in the mean refuge ratings, and vice versa.

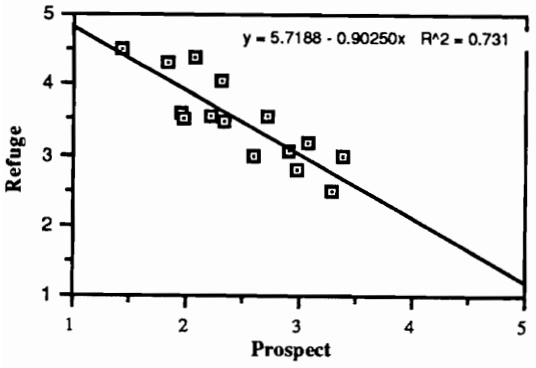
Figure 3(a,b,a) graphically displayed such linear negative relationship. The figures clearly showed that within a painting as its prospect got higher, its refuge became lower, and vice versa. In this study, paintings with high refuge scores (#24, #14, #12, #2, #8) were all among those with low prospect; on the other hand, paintings with low refuge scores (#10, #28, #26, #5, #4, #16) were all among those with high prospect.

Table 4. Simple correlation between prospect and refuge (Pearson r).

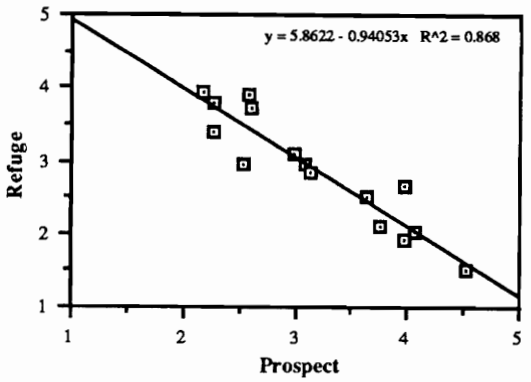
	# of Paintings	Prospect vs refuge	
		r	p. level
Overall paintings	30	-0.92	0.0001
Chinese paintings	15	-0.86	0.0001
Western paintings	15	-0.93	0.0001



a. Relationship between prospect and refuge for all the paintings



b. Prospect vs refuge in Chinese paintings



c. Prospect vs refuge in Western paintings

Figure 3. Relationship between prospect and refuge

D. The Assessment of Preference

Landscape paintings have always been regarded as one of the tools to express human's landscape preference. Yet paintings in different historical periods and cultural contexts have not always appeared to be the same. On the other hand, landscape preferences vary individually because of multiple influences such as cultural conditions and personal development. Nevertheless, as aesthetic subjects, humans share commonalities in aesthetic activities. This section, through preference rating, was to identify those common aesthetic quality that were present in the paintings and shared by the individual participants. The intention was to see whether these common aesthetic qualities were related to the symbolisms of prospect and refuge.

Fifty participants rated preference for each of the 30 paintings. Mean scores and standard deviations for each of the paintings were reported in Table 3. In a 5-point categorical scale, the means for the painting ranged from a low of 2.84 to a high of 4.44. This was interpreted that participants' preference towards these paintings ranged from close to "moderately like" to "like/like very much." These 30 mean scores were displayed in a mean frequency distribution bar to see the general response of the participants towards the paintings. The distribution was skewed to the upper end of the rating scale. This indicated that participants generally had positive responses to the paintings.

A further examination was conducted to analyze paintings with high preference scores and those with low scores. It was intended to see if there were any patterns which would explain why paintings were liked or disliked.

Paintings with high preference scores were #6, #2, #19, #11, #26, #8, #14, #24 (Appendix IV). Landscapes depicted in these paintings had a strong sense of enclosure (refuge symbol). Views into the landscapes were strongly framed by vertical elements such as mountains and vegetation (refuge symbol). Landscapes were heavily vegetated (refuge symbol), except #19 and #14. Painting #19 and #14 showed signs of buildings and ships (refuge symbol). Landscapes were very legible in their foreground details.

Paintings with low preference scores were #27, #16, #21, #20, #28, #4, #5 (Appendix IV). Contrary to the most preferred, the least preferred paintings had less vegetation. Landscapes were very open, and had extensive views (prospect symbol), except #27 and #20. Painting #27 received the lowest score (2.84). Painting #20 was the third lowly rated. Neither of them fell in the pattern of "open landscapes." Painting #27 depicted a water fall and a small mountain. Yet due to the yellowish dust casted on the painting, the contrast of mountain and water fall was apparently reduced, which might explain its being unfavorable in the preference rating. The possible explanation for painting #20 might be its lack of complexity. The landscape was very simple and was overwhelmingly dominated by a cave (refuge symbol).

The assessments of preference concluded that there was a general positive response to the paintings among the participants. Furthermore, it seemed that landscapes with a strong sense of enclosure (refuge symbol) and abundant presence of vegetation (refuge symbol) were more preferred than those landscapes which were flat and open, without distinguishable vegetation (prospect symbol). In other words, there seemed to be some relationships between preference and the symbolisms of prospect and refuge.

E. The Relationship among Preference, Prospect, Refuge

The assumption underlying the prospect-refuge theory is that aesthetic pleasure in landscapes is derived from humans' survival nature. Landscapes that provide both opportunities to see and places to hide (that is, both prospect and refuge) are beneficial to humans' survival; therefore, they are also aesthetically pleasurable. In the previous assessments, both prospect and refuge were found to be present in the paintings, and a general positive response was also found among the participants in their preference rating. Moreover, there seemed to be some relationship between landscape preference and prospect and refuge. The following section examined the relationships among the three factors--preference, prospect, and refuge.

First, Nonparamatric correlation tests were conducted (Table 5). They were to test the correlations between preference and prospect, and between preference and refuge. For the 30 paintings overall, the tests did not reveal any statistically significant correlations ($\alpha=0.10$) between preference and prospect, or between preference and refuge. Further tests were done for both Chinese and Western paintings. No significant correlations ($\alpha=0.10$) were found in the two painting groups. The scatter plots again illustrated this point. Figure 4 plotted the mean preference scores against the relevant mean prospect scores for each of the 30 paintings. Figure 5 plotted the mean preference score against the mean refuge scores for each of the 30 paintings. No patterns emerged in either scatter plot. For the examples in figure 4, paintings with preference means near 3.80, their relevant prospect scores ranged from 1.44, 2.28, 3.64 to a high of 4.52. The random pattern was also observed in figure 5, with preference mean scores near 3.80,

Table 5. Simple correlations between preference and prospect, and between preference and refuge (Pearson r).

	# of Paintings	Preference vs prospect		Preference vs refuge	
		r	P. level	r	p. level
Overall paintings	30	-0.08	-0.697	0.16	0.403
Chinese paintings	15	-0.05	0.858	0.17	0.536
Western paintings	15	-0.16	0.554	0.23	0.407

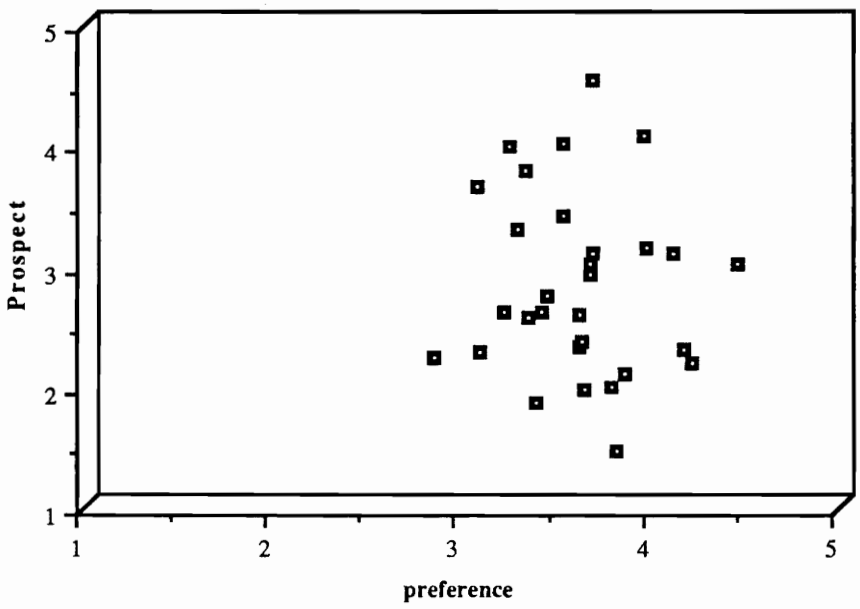


Figure 4. Relationship between preference and prospect.

Scatter plot of the mean preference scores against the mean prospect scores of the 30 paintings.

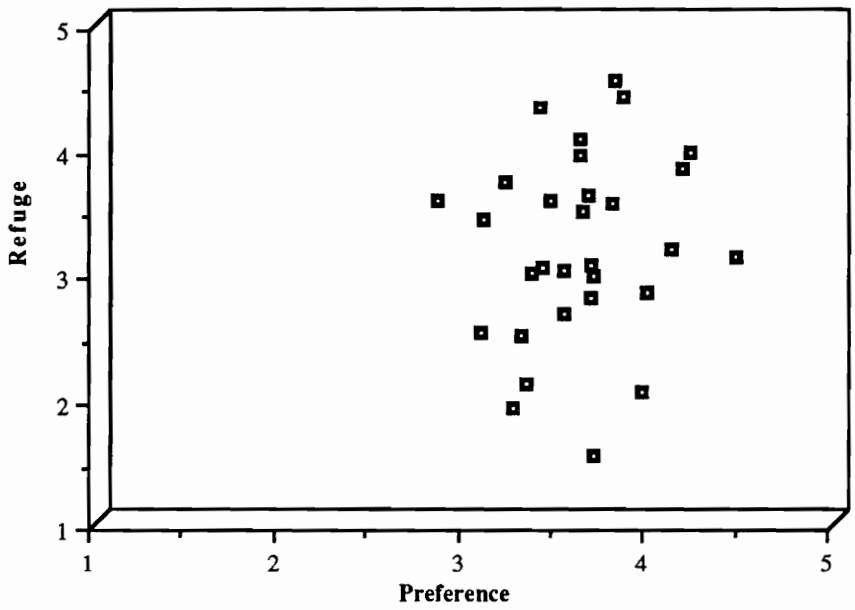


Figure 5. Relationship between preference and refuge.

Scatter plot of the mean preference scores against the mean refuge scores of the 30 paintings.

their relevant refuge scores ranged from 1.52, 2.82, 3.52 to 4.50. This indicated that statistically there were no direct relationships between the preference rating and the prospect rating, as well as between the preference rating and the refuge rating.

However, simple correlations did not reveal all relationships. Moreover it is the combination of prospect and refuge that the prospect-refuge theory proposes to explain aesthetic behaviors. Therefore, further tests were conducted using multiple regression methods (Table 6). First, prospect and refuge were taken separately to predict preference. Neither prospect nor refuge appeared to explain any significant variance ($\alpha=0.10$) in the preference rating. This further verified the simple correlation results. Then prospect and refuge were taken together to predict preference, and, surprisingly, they did not explain any significant variance ($\alpha=0.10$) in preference rating either. It was interpreted that although both prospect and refuge were present, they did not exert any significant influences on people's preference for the landscapes.

After the above assessments, both prospect and refuge were found to be present in the landscapes, and a generally positive response to these landscapes was also observed. However, the statistical methods used in this study were not able to predict landscape preference from the prospect-refuge symbolic framework contained in these landscapes. In other words, the results generated from the study were not able to support the hypothesis that landscapes with prospect-refuge are aesthetically pleasurable, because the study was not able to find any significant relationship between landscape preference and the prospect-refuge symbolic system.

Table 6. Preference predicted from the multiple regression tests.

	Prospect	Refuge	Prospect & refuge
R Squared	0.0055	0.0251	0.0585
Prob. level	0.697	0.403	0.443

F. Age, Sex, Major, Childhood Landscape and the Rating of Preference, Prospect, Refuge

Although this study was not able to statistically predict preference from prospect-refuge symbolic system, that symbolic system was found to be present in Chinese and Western cultures in various historical periods. It is also cross-culturally recognized. It seems that prospect-refuge theory is biologically related. To further study this biological claim of the theory, this section employed age, sex, educational major, and childhood landscape experiences as variables to examine their possible influences on the perception of prospect and refuge and preference rating. Multiple analysis of variance procedures were used. They were to test the mean differences of the ratings between and/or among the various groups.

Age The 50 participants were divided into 5 age groups (Table 7). The majority of the participants (39) were between the age of 21 and 35. Nine were above the age of 36, and only two participants were under the age of 20. Means for preference, and prospect and refuge scores were computed for each of the five age groups. The group means were very close to each other. The test results did not find any significant differences ($\alpha=0.10$) between or among the five age groups. The test suggested that age did not exert any influences in the perception of prospect and refuge among the participants. No age-related difference in landscape preference was observed in this study either (This finding concerning preference was not inconsistent with the findings from other studies, because the age discrepancies among the groups in this study were generally small).

Table 7. Age differences in preference, prospect and refuge

Age	# of Participants	Preference		Prospect		Refuge	
		Mean	Stdev	Mean	Stdev	Mean	Stdev
20 <	2	3.20	.93	2.67	1.11	2.87	.97
21-25	6	3.39	.41	2.94	.74	3.29	.73
26-30	21	3.59	.40	2.77	.76	3.16	.75
31-35	12	3.71	.57	2.74	.85	3.29	.87
36 >	9	3.69	.46	2.97	.81	3.09	.82
Prob. Level		0.528		0.183		0.667	

Sex Of the 50 participants, 31 were males and 19 were females (Table 8). Means for preference, prospect and refuge were computed for both male and female groups. The means for all three factors were quite close between the two genders. Again, no statistically significant differences (α=0.10) were found between the two sex groups in their ratings of prospect, refuge, as well as preference. This indicated that sex did not have any effect on the perception of prospect and refuge. No sex related difference was found in preference rating either.

Educational Majors Potential influences of participants' majors in school were also considered. Of the 50 participants, except one of the participants who did not fill out the blank, a total of 25 majors were identified (Table 2). Since there were great diversities in educational majors among the participants, it did not seem to be possible to conduct any analyses major by major. The influence of educational level among the participants was small. 96% of the participants had at least three or four years of college education, or were currently working on their graduate educations. Since both prospect and refuge were found to be present in landscapes in this study, even though participants were from diverse educational majors, it seemed that major did not have much effect on the perception of prospect and refuge.

Childhood Landscapes Participants' childhood landscapes were also analyzed to see if they bore any relationships in the rating of preference and judgement of prospect and refuge (Table 9). Childhood landscapes were subdivided into three categories: settlement pattern, topography, and dominant vegetation.

Table 8. Sex differences in preference, prospect and refuge.

Sex	# of Participants	Preference		Prospect		Refuge	
		Mean	Stdev	Mean	Stdev	Mean	Stdev
Male	31	3.56	.39	2.83	.74	3.26	.79
Female	19	3.66	.37	2.80	.81	3.03	.67
Prob. Level		0.475		0.739		0.127	

1) Settlement Pattern: The settlement pattern was divided into village, small town and city, which are typical categories in China. Of the 50 participants, thirty two were from cities, twelve from small towns, and only six from villages. The mean scores for preference, prospect, and refuge were calculated for all three groups. The test did not find any significant difference ($\alpha=0.10$) among the three groups in the rating of preference, prospect and refuge.

2)Topography: Topography was divided into flat, rolling hills, and mountainous. Thirty of the participants were from flat terrains, thirteen from rolling hills, and seven from mountainous terrains. Again, mean scores for preference, prospect and refuge were calculated for the three groups, and no significant group differences emerged ($\alpha=0.10$).

3)Dominant Vegetation: Due to great geographical and meteorological divergences in China and its vast territory, the dominant vegetation included in this analysis was categorized into desert, grassland, mostly deciduous, mostly conifer, mixture of deciduous and conifer, and other. The analysis showed that no participant was from desert, only one in the mostly conifer group, two in other, the majority from mostly deciduous group (13 participants) and a mixture of deciduous and conifer group (32 participants). Means scores for preference, prospect and refuge were computed for each of the five groups, no significant statistical differences were observed among those groups.

The assessments of childhood landscapes seemed to indicate that childhood landscapes--in terms of settlement pattern, topography and dominant vegetation--did not have any influences on people's perception of prospect and refuge. No statistically

Table 9. Childhood landscapes and preference,prospect, refuge.

A. Settlement Pattern

	# of participants	Preference		Prospect		Refuge	
		Mean	Stdev	Mean	Stdev	Mean	Stdev
Village	6	3.47	.46	2.70	.80	3.02	.87
S. Town	12	3.63	.36	2.76	.73	3.34	.78
City	32	3.61	.42	2.87	.77	3.16	.73
Prob. Level		0.793		0.307		0.291	

B. Topography

	# of Participants	Preference		Prospect		Refuge	
		Mean	Stdev	Mean	Stdev	Mean	Stdev
Flat	30	3.61	.38	2.82	.78	3.17	.76
R. Hills	13	3.72	.44	2.78	.73	3.18	.79
Mountain	7	3.34	.37	2.81	.75	3.25	.75
Prob. Level		0.263		0.867		0.918	

C. Dominant vegetation

	# Of Participants	Preference		Prospect		Refuge	
		Mean	Stdev	Mean	Stdev	Mean	Stdev
Desert	0						
Grassland	2	3.60		3.11		3.25	
Deciduous	13	3.75	.36	2.76	.77	3.29	.82
Conifer	1	3.67		2.63		4.03	
Mix	32	3.51	.43	2.83	.77	3.11	.75
Other	2	3.98		2.93		3.18	
Prob. Level		0.484		0.515		0.23	

significant influences were found in their preference rating either. However, caution must be taken in interpreting the results, because there might be some statistical biases which resulted from the uneven distribution of the participants in the compared groups.

After examining age, sex, educational major and childhood landscapes, no significant influences were found of those variables on the rating of prospect and refuge. It might be interpreted that the prospect-refuge symbolic system is biologically related. Moreover, this study did not find any statistically significant influences of sex, age and childhood landscapes on preference rating. However, because there was an uneven distribution of the participants in the compared groups, this might have caused some biases in the results. Caution thus has to be taken in generalizing the results.

G. Comparison between Chinese Paintings and Western Painting in Prospect-Refuge Symbolic Framework

Landscape paintings in both Chinese and Western cultures have long histories. They are unique in terms of styles and characteristics because of the specific influences of their geography, histories, religions and cultural background. Nevertheless, landscape paintings have always been one of the tools to express humans' landscape preference, and they depict humans' relationship with the natural environment. In the above assessments, both prospect and refuge were found to be present in Chinese and Western paintings. This section compared the unique characteristic of both Chinese and Western landscape paintings within the prospect-refuge symbolic framework. The method used was statistical paired t-test.

The comparison was between the 15 Chinese paintings and 15 Western paintings. A paired t-test was used to test the mean differences between the two painting groups in the categories of preference, prospect and refuge. The test results were summarized in Table 10. Significant statistical differences ($\alpha=0.10$) were found between Chinese and Western paintings in the rating of prospect and refuge. Western paintings had significantly higher prospect rating (a mean of 3.17) than Chinese paintings (a mean of 2.47); in contrast, Chinese paintings had significantly higher refuge scores (a mean of 3.49) than Western paintings (a mean of 2.88). Within Chinese paintings, the refuge rating was much higher than the prospect rating. The refuge symbolism was half way between "moderately present" to "strongly present"; the prospect symbolism was only half way between "somewhat present" to "moderately present." Within Western paintings, both symbolisms were close to "moderately present," with prospect rating slightly higher than refuge rating. However, despite the different compositions of the two symbolisms within paintings, the mean preference between the two painting groups was very close. Chinese paintings had a mean of 3.57, Western paintings had 3.63. Both painting groups were in the range of "moderately like" to "like." There was no significant statistical difference ($\alpha=0.10$).

The comparison of the two groups in the categories of preference, prospect and refuge were further illustrated in Figure 6. The figure showed that both painting groups received very close rating in preference, but there was a significant difference in prospect rating and refuge rating.

The comparison revealed that there was a difference in depicting prospect and

Table 10. Comparisons between Chinese and Western landscape paintings in the categories of preference, prospect, refuge.

	Preference		Prospect		Refuge	
	Mean	Stdev	Mean	Stdev	Mean	Stdev
Chinese paintings	3.57	.29	2.47	.57	3.49	.61
Western paintings	3.63	.43	3.17	.77	2.88	.77
Prob. level	0.5005		0.0001		0.0001	

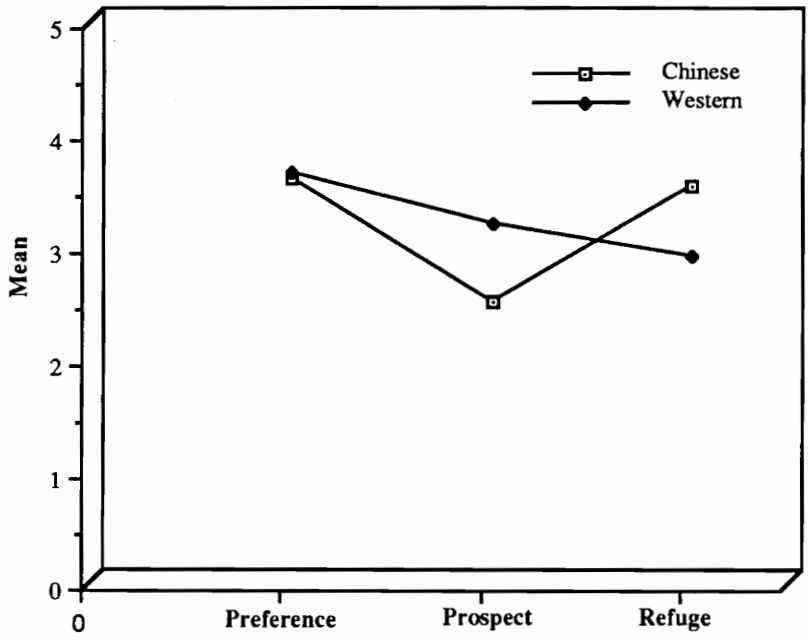


Figure 6. Graphic display of the comparison between Chinese and Western landscape paintings in preference, prospect and refuge.

refuge between Chinese and Western paintings. Chinese paintings tend to depict more refuge and less prospect than Western paintings. Within an individual painting group, Chinese paintings tend to depict more refuge than prospect, while Western paintings tend to balance those two symbolisms, with prospect a little higher than refuge. These differences may be attributable to the influences of the unique geography, histories and cultural background of the two cultures. However, despite the varying depiction of these two symbolisms, both painting groups achieved an equal level of aesthetic satisfaction. This seemed to further indicate that there was no direct relationship between preference and the prospect-refuge symbolic system.

Summarizing all the results of the above assessments, the following highlight these main points:

1. Prospect and refuge were present in Chinese and Western landscape paintings in different historical periods.
2. The prospect-refuge symbolic system was cross-culturally recognized.
3. No statistically significant influences of age, sex, educational majors and childhood landscapes were observed on the perception of both prospect and refuge.
4. Neither prospect nor refuge had a relationship with preference individually. Together they had no statistically significant relationship with preference either.
5. There were differences between the Chinese and the Western landscape paintings in their depiction of prospect and refuge. Chinese paintings had more refuge and less prospect than Western paintings. However, the different compositions of prospect

and refuge in the two painting groups had no effect on the preference rating. This seemed to further suggest that there was no direct relationship between preference and the prospect-refuge symbolic system.

V. CONCLUSION

Because the statistical method used in this study did not find any significant relationship between the prospect-refuge symbolic system and landscape preference, this study was not able to support the central claim of the theory that landscapes with prospect and refuge are aesthetically pleasurable. On the other hand, because the symbolic system was found to be present, this study was not able to prove, conversely, that landscapes without prospect and refuge are not aesthetically pleasurable, either. Thus, the validity of the theory is still not clear. This result which"neither supports nor negates the theory" was, however, consistent with the finding of Clamp and Powell (1982).

Nevertheless, the present study did generate some positive clues which seemed to support the biological claim of the theory and suggest the possible indirect relationship between the prospect-refuge symbolic system and landscape preference.

The support for the biological claim of the theory came from three aspects. First, since this study found that all these paintings of Chinese and Western cultures from different historical periods depicted in varying degree the prospect-refuge symbolic system, this seemed to indicate that the prospect-refuge symbolic system was not the product of culture and it was not evolved historically, either. It suggested that the symbolic system might be constant and biological related. Secondly, this study found that the participants acknowledged the prospect-refuge symbolic system in the landscape paintings not only of their own culture (Chinese culture), but also of others (Western

culture). This cross-cultural examination further excluded culture as the origin of the prospect-refuge symbolic system and suggested its inclination towards the biological nature. Thirdly, this study did not find any significant influences of age, sex, educational major, and childhood landscapes on the perception of prospect-refuge symbolic system. This finding provided further support that prospect-refuge symbolic system might be biologically related. Therefore, findings of this study seemed to support the biological foundation of prospect-refuge theory.

Although no direct relationship had been found between the prospect-refuge symbolic system and landscape preference, evidences of the study provided suggestions of their possible indirect relationship. First of all, this study was conducted in the medium of landscape paintings, and landscape paintings generally have been regarded as one of the tools to express humans' landscape preference. Since landscape paintings from Chinese and Western cultures in different historical periods overall depicted the prospect-refuge symbolic system, this seemed to suggest that some kind of relationship between landscape preference and the prospect-refuge symbolic system exists. Moreover, even though the prospect-refuge symbolic system present in the paintings was not able to predict preference statistically, the preference ratings towards the landscape paintings were very positive in the study. This again seemed to suggest the possible indirect relationship between the prospect-refuge symbolic system and landscape preference. Unfortunately, the present study was not able to identify this relationship.

The reasons for the failure to identify the relationship between the prospect-refuge symbolic system and landscape preference could be several. In this study, as revealed

in the comparison between the Chinese and the Western landscape paintings, it seemed that elements besides prospect and refuge were also contributing to preference. The comparison showed that there were significant differences between the Chinese and the Western landscape paintings in their depiction of prospect and refuge, however, the preference between the two painting groups was not different. This suggested that if the prospect-refuge symbolic system contributed to preference, besides these two elements, there were other factors that had effects on preference as well. However, since this study focused only on prospect and refuge as predictors to landscape preference, and all these "other elements" were excluded. This situation made it statistically impossible to detect any relationship between preference and the prospect-refuge symbolic system. It is thus speculated that if more factors (such as cultural influences and personal influences) were loaded into the preference prediction, it might be possible to find some statistically significant relationship between the prospect-refuge symbolic system and landscape preference.

This study concluded that prospect-refuge seems to be a common landscape perception system and seems to be biologically related, moreover, that common system appears to be related to landscape preference. However, additional validation study is still needed in order to understand its full significance in landscape perception research and employ its aesthetic principle on the practical level of landscape management, planning and design.

The implication of this study was limited. Since this study did not find any relationship between the prospect-refuge symbolic system and landscape preference, the

present study did not validate the theory and was unable to claim that the biological perspective to landscape aesthetic has its standing in prospect-refuge theory. Nevertheless, the study did provide support that humans' perception of landscapes occurs at least partially at biological level. In our effort to establish a comprehensive theoretical framework for landscape perception research, the biological perspective is thus necessary as advocated by other studies. More empirical research is still needed to understand common landscape perception that are shared by humans at the biological level. The more we understand, the better we shall be able to do landscape management, planning and design works, which in return will be beneficial to human as a whole.

ADDENDUM

There are some words about caution in generalizing the findings of the present study.

First, because this study was conducted in the medium of landscape paintings, there is a limiting factor in applying landscape paintings in perception studies, as in "real life" situation other sensory factors such as smell, taste, touch, temperature play important roles in people's perception. Although there is little known about these interferences, they might influence the visual perception subconsciously. Caution has to be taken in generalizing the findings.

Secondly, as the numbers of landscape paintings studied was also limited, caution again has to be guarded in generalizing the result beyond the scope of this study.

Lastly, in the survey of prospect and refuge, participants were shown example-slides to demonstrate the 5-point categorical range of prospect and refuge. This might cause biases in determining the biological perspective of prospect-refuge theory.

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INDEX OF PAINTINGS

Western Paintings

Chinese Paintings

#12. Dai Jin (1388-1462), *Travellers Through Mountain Passes.*
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#15. Xiang Shengmo, *Illustrations in the Spirit of Wang Wei's Poems,* 1629.
#17. Xiang Shengmo, *Illustrations in the Spirit of Wang Wei's Poems,* 1629.
#18. Zou Zhe, *Conversing with a Monk in a Pine Forest*, 1647.
#19. Wu Wei (1459-1508), *The Pleasures of Fishing.*
#22. Wang Li (1332-?), *Landscape of Huashan.*
#24. Wu Bin (paintings dated 1568-1626), *A Thousands Cliffs and Myriad Ravines.*
#27. Fan Kuan (early 11 century), *Traveling among Streams and Mountains.*
#29. Wu Chen (1280-1354), *Fisherman,* 1342.

Appendix I

Survey Instruction

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

Landscape Architecture Program

College of Architecture and Urban Studies
202 Architecture Annex
Blacksburg, Virginia 24061-0113
(703) 231-5583 Fax: (703) 231-3367

To whom it may concern:

I am a graduate student in Landscape Architecture Program at Virginia Tech. I am doing my Master's thesis on landscape preference. The aim of the thesis is to test a landscape theory called prospect-refuge theory. Understanding the theory will help landscape architects to do better landscape designs. The research method I am using is to ask people to rate landscape paintings from both Chinese and Western cultures. The ratings requested are their preference of the paintings, the extent to which prospect elements are present in the scenes of the paintings and the extent to which refuge elements are present as well.

This study is being done in partial fulfillment of the requirements for the Master of Landscape Architecture Degree. Your participation in the study is voluntary. Your identity in this study will remain anonymous. If your have further questions concerning this study, please contact me at (703) 953-4038 or my thesis adviser Dr. Patrick A. Miller in the Landscape Architecture Program at (703) 231-5506.

Researcher: Yuemao Xu
Address: R-12 Apt Heights
Blacksburg, VA, 24060

Appendix II

Survey Questionnaire.

I. SURVEY OF PREFERENCE FOR LANDSCAPE PAINTINGS

Preference is how much or to what degree a person likes a landscape.

Please circle the number which most closely indicates the degree to which you prefer the paintings.
1 = do not like 2 = like somewhat 3 = moderately like 4 = like 5 = like very much

1	1	2	3	4	5	**20**	1	2	3	4	5
2	1	2	3	4	5	**21**	1	2	3	4	5
3	1	2	3	4	5	**22**	1	2	3	4	5
4	1	2	3	4	5	**23**	1	2	3	4	5
5	1	2	3	4	5	**24**	1	2	3	4	5
6	1	2	3	4	5	**25**	1	2	3	4	5
7	1	2	3	4	5	**26**	1	2	3	4	5
8	1	2	3	4	5	**27**	1	2	3	4	5
9	1	2	3	4	5	**28**	1	2	3	4	5
10	1	2	3	4	5	**29**	1	2	3	4	5
11	1	2	3	4	5	**30**	1	2	3	4	5
12	1	2	3	4	5	**31**	1	2	3	4	5
13	1	2	3	4	5	**32**	1	2	3	4	5
14	1	2	3	4	5	**33**	1	2	3	4	5
15	1	2	3	4	5	**34**	1	2	3	4	5
16	1	2	3	4	5	**35**	1	2	3	4	5
17	1	2	3	4	5	**36**	1	2	3	4	5
18	1	2	3	4	5	**37**	1	2	3	4	5
19	1	2	3	4	5	**38**	1	2	3	4	5

II. ASSESSMENT OF PROSPECT IN THE LANDSCAPE

A sense of **Prospect** is present when the landscape appears to provide extensive and commanding views which promise to provide a greater understanding of the surrounding landscape.

Please circle the number which most closely indicates the degree to which prospect is present in the paintings.
1 = not present 2 = slightly present 3 = moderately present 4 = strongly present 5 = very strongly present

1	1	2	3	4	5	**20**	1	2	3	4	5
2	1	2	3	4	5	**21**	1	2	3	4	5
3	1	2	3	4	5	**22**	1	2	3	4	5
4	1	2	3	4	5	**23**	1	2	3	4	5
5	1	2	3	4	5	**24**	1	2	3	4	5
6	1	2	3	4	5	**25**	1	2	3	4	5
7	1	2	3	4	5	**26**	1	2	3	4	5
8	1	2	3	4	5	**27**	1	2	3	4	5
9	1	2	3	4	5	**28**	1	2	3	4	5
10	1	2	3	4	5	**29**	1	2	3	4	5
11	1	2	3	4	5	**30**	1	2	3	4	5
12	1	2	3	4	5	**31**	1	2	3	4	5
13	1	2	3	4	5	**32**	1	2	3	4	5
14	1	2	3	4	5	**33**	1	2	3	4	5
15	1	2	3	4	5	**34**	1	2	3	4	5
16	1	2	3	4	5	**35**	1	2	3	4	5
17	1	2	3	4	5	**36**	1	2	3	4	5
18	1	2	3	4	5	**37**	1	2	3	4	5
19	1	2	3	4	5	**38**	1	2	3	4	5

III. ASSESSMENT OF REFUGE IN THE LANDSCAPE

A sense of **Refuge** is present when the landscape appears to provide potential for giving shelter, protection or aid from trouble, danger or pursuit.

Please circle the number which most closely indicates the degree to which refuge is present in the paintings.
1=not present 2=slightly present 3=moderately present 4=strongly present 5=very strongly present

1	1	2	3	4	5	**20**	1	2	3	4	5
2	1	2	3	4	5	**21**	1	2	3	4	5
3	1	2	3	4	5	**22**	1	2	3	4	5
4	1	2	3	4	5	**23**	1	2	3	4	5
5	1	2	3	4	5	**24**	1	2	3	4	5
6	1	2	3	4	5	**25**	1	2	3	4	5
7	1	2	3	4	5	**26**	1	2	3	4	5
8	1	2	3	4	5	**27**	1	2	3	4	5
9	1	2	3	4	5	**28**	1	2	3	4	5
10	1	2	3	4	5	**29**	1	2	3	4	5
11	1	2	3	4	5	**30**	1	2	3	4	5
12	1	2	3	4	5	**31**	1	2	3	4	5
13	1	2	3	4	5	**32**	1	2	3	4	5
14	1	2	3	4	5	**33**	1	2	3	4	5
15	1	2	3	4	5	**34**	1	2	3	4	5
16	1	2	3	4	5	**35**	1	2	3	4	5
17	1	2	3	4	5	**36**	1	2	3	4	5
18	1	2	3	4	5	**37**	1	2	3	4	5
19	1	2	3	4	5	**38**	1	2	3	4	5

The following information is required for statistical analysis only.

1. Age: ___20 and below, ___21-25, ___26-30, ___31-35, ___36 and upper
2. Sex: ___M, ___F
3. Major: _____
4. For each of the following, check the item which most closely describes the landscape where you spent most of your childhood.
   a) settlement pattern:___villiage, ___small town, ___city
   b) topography: ___flat, ___rolling hills, ___mountainous
   c) predominant vegetation: ___desert, ___grassland, ___mostly deciduous trees, ___conifer trees, ___mix of deciduous and conifer trees, ___other

Appendix III

Painting examples to demonstrate the 5-point categorical range of prospect and refuge.
(P=prospect, R=refuge)

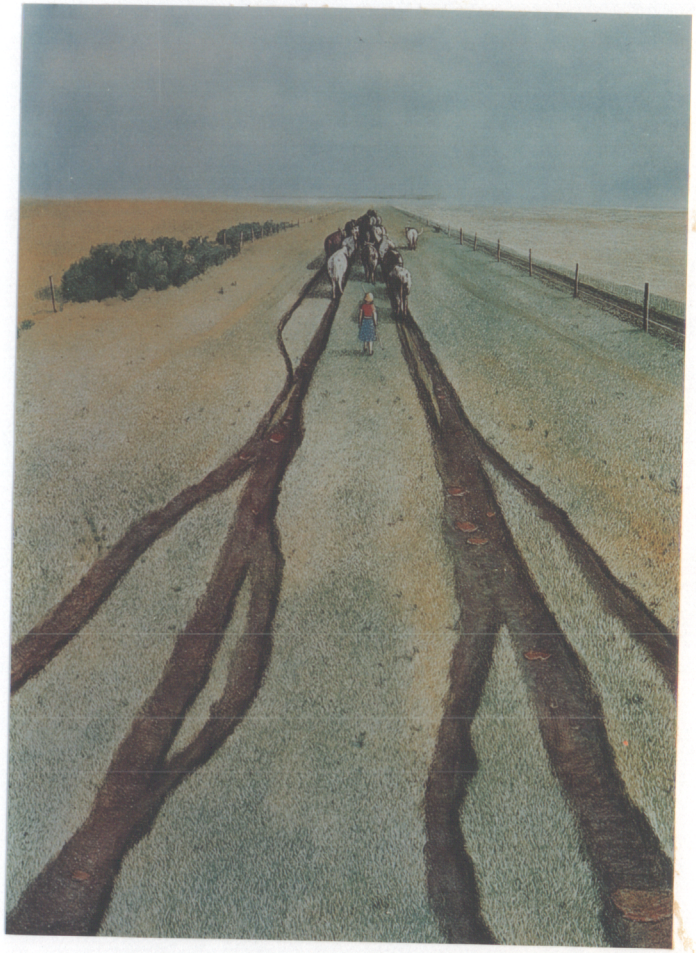
P1. Prospect is not present.

P2. Prospect is somewhat present.

P3. Prospect is moderately present.

P4. Prospect is strongly present.

P5. Prospect is very strongly present.



R1. Refuge is not present.

R2. Refuge is somewhat present.

R3. Refuge is moderately present.

R4. Refuge is strongly present.

R5. Refuge is very strongly present.

Appendix IV

Landscape paintings used in the survey.

#1

#2

#3

#4

#5

#6

#8

#7

#9

#10

#11

#12

#13

#14

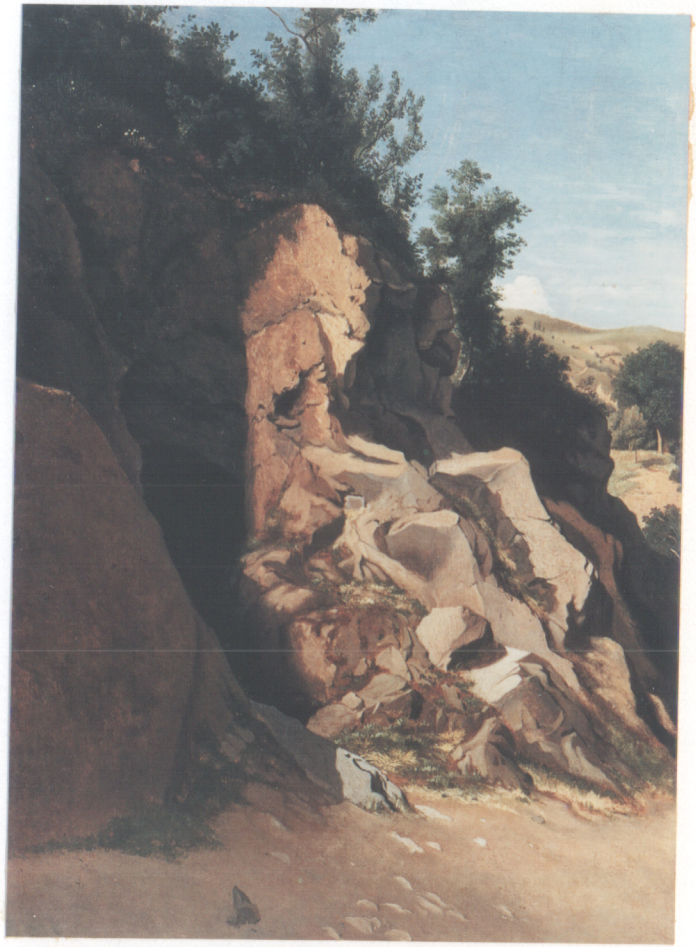
#15

#16

#17

#18

#19



#20

#21

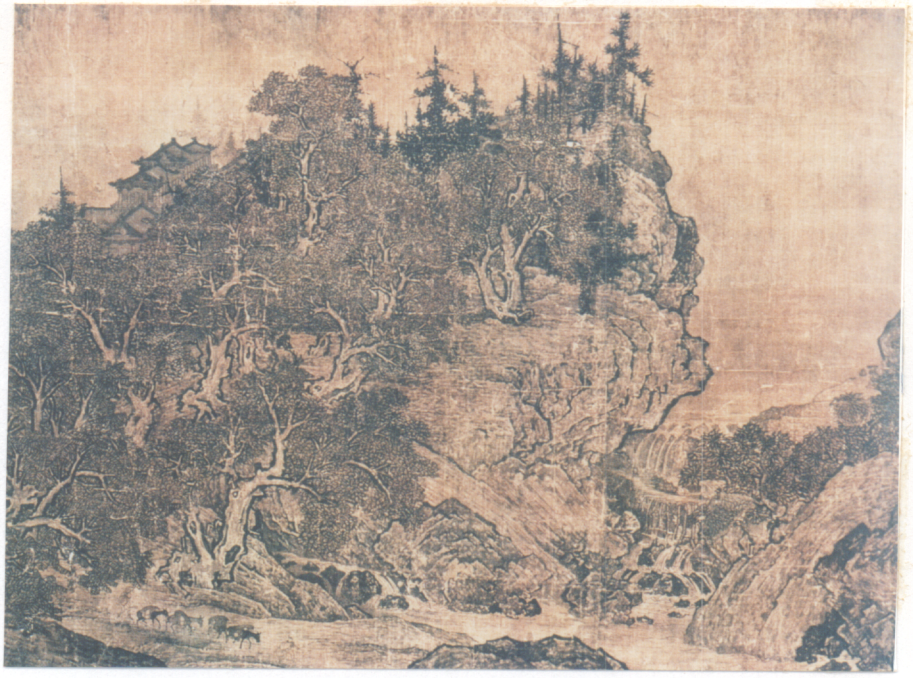
#22

#23

#24

#25

#26



#27

#28

#29

#30

VITA

Yuemao Xu

Date of birth: Aug.15. 1964
Place of birth: Tiantong Street, Ningbo, Zhejiang, P. R. China.

Education

Aug., 1991--Oct., 1993, Master of Landscape Architecture at Virginia Polytechnic Institute and State University, Blacksburg, Virginia, U.S. A.

Sep., 1982--July, 1986, Bachelor of Art in English Literature at Zhejiang Teachers University, Jinhua, Zhejiang, P.R. China.

Awards, Work Experience and Publication

1993--1994. Graduate Research Award from the Graduate Research Development Project, Graduate Student Assembly, Virginia Polytechnic Institute and State University.

1992--1993. Tuition Scholarship Awards. Dept. of Landscape Architecture, Virginia Polytechnic Institute and State University.

July, 1986--July, 1987, Teaching at Ningjiang High School, Zhejiang, P. R. China.

Sep., 1985--Nov., 1985, Teaching at Jiangshan High School, Zhejiang, P.R. China.

1985, First Place winner in Undergraduate Reading Competition, Zhejiang Teachers University, P. R. China.

"Talking about Permanence", *Golden Time*. 1983, JinHua, Zhejiang Teachers University.