A Landscape Preference Study Of Campus Open Space

Ying Zhang

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A LANDSCAPE PREFERENCE STUDY
OF CAMPUS OPEN SPACE

By
Ying Zhang

A Thesis
Submitted to Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Master of Landscape Architecture
in Landscape Architecture
in the Department of Landscape Architecture

Mississippi State, Mississippi
May 2006
A LANDSCAPE PREFERENCE STUDY
OF CAMPUS OPEN SPACE

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The current study is an empirical study of preference for campus open space around the drill field on Mississippi State University (MSU) campus. 83 students at Mississippi State University were selected as research objects. Based on the literature review, a research process was designed to employ VEP, content analysis and multivariate analysis---Biplot to explore the interested research problems. The study identified two most preferred landscape scene types - “Legibility” and “Coherence” using Kaplan’s “information processing model”. A statistical analysis tool for multivariate analysis-Biplot was used to reveal the landscape preference patterns for campus open space as well as how certain landscape features can contribute these patterns. The study found factors such as gender, educational and cultural background can heavily affect these patterns. The result indicated that “vegetations” including tree, seasonal flowers and open grassland, were the most preferred landscape feature on campus open space. Finally, the limitations of this study were discussed and some recommendations for future landscape preference study were provided.
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CHAPTER I

INTRODUCTION

“With knowledge of the relationship between properties of visual environment and human affect, design professionals can be better plan, design, and manage settings to fit the preferences and activities of users. This, in turn, may contribute to enhancing the quality of life.” (Nasar, 1988, Preface pp. xxi)

Context

Landscape is an everyday life experience. As pointed out by Kaplan, “Landscape is an illusive phenomenon. It has been difficult to define and even more difficult to assess (pp. 161).” Also, “to say that landscape is a visual resource is to admit to the integral tie between the physical aspects of the land and the human experience of it” (Kaplan 1985, pp. 161).

Landscape preference, as an approach of landscape assessment, is an evaluation how people perceive the surrounding environment and what the preferred landscape is that people have in mind. As Laurie (1975) pointed out, landscape evaluation may be defined as “the comparative relationship between two or more landscapes in terms of assessment of visual quality” (pp.103). Therefore, in the experience of nature, there is no doubt that the visual quality is important. As Nasar (1988) pointed out, “Visual quality may well influence well-being and behavior” (pp. xxiii).
Starting from the 1960’s, landscape preferences have been studied for more than 40 years. Through these preference studies, the design professionals of landscape architecture have opportunities to better understand the relationships between human preference and landscape features and aim to enhance the quality of life (Nasar 1988). Nowadays, the landscape designers, planners, or decision makers have already benefited a lot from all kinds of landscape preference studies. Various theories and application results of landscape preference studies have provided landscape designers or planners the guidelines and principles on how to design an enjoyable human environment and help the decision makers manage landscape settings for their users (Kaplan 1982; Nasar, 1988).

In the literature, the nature of the perception of physical environments, the nature of the response to such environments, the linkage between environmental appraisal and features of the environment, and the effects of aesthetic surroundings on human inhabitants were the major concerns for landscape preference studies. The study purpose is to examine the relationships between landscape features of scenes and appraisals of those scenes.

In attempting to quantify emotional responses to visual attributes of the environment, investigators have employed a variety of methods. Studies varied in choice of subjects, scenes, modes of presentation, measures of environmental attributes, measures of effect, and analytic procedures. Some observations can be summarized as follows:

1. Decisions about the visual quality of the environment are often made by design professionals and they differ from the public in their environment preferences. Furthermore, such differences are not trivial and can result in
widespread effects. Arthur et al. (1977) pointed out that the recent upsurge in public interest in preserving the beauty of public lands has resulted in the development of scenic assessment based on public input. Therefore, the techniques for a landscape preference study should be designed to be able to reveal and measure the public preference. The Visitor Employed Photography (VEP) method introduced by Chereme (Chenoweth 1984) is a user-based data collection method that can be used to enhance the validity and reliability of the landscape preference research.

2. The investigation of the landscape settings included natural landscape, such as forest (e.g., Daniel & Boster 1976; Arthur 1977; Shafer, Brush 1977; Ribe 1989), rural landscape (e.g., Yu 1984; Ryan 2002), urban landscape (e.g., Nasar 1983; Stamps 1997), residential (e.g., Nasar 1988;) and building façade, and also architecture interior (e.g., Kasmar 1970; Flynn 1974). Recently, several preference studies are focusing on the specific landscape, such as water (Yamashita 2002; Nasar and Lin 2003) and streetscape (Duarte 2000), and vegetation, such as street trees (Wolf 2003) have been published. However, there are very few publications of landscape preference related to the campus open space in the literature.

3. Various landscape assessment models have been developed. Zube et al. (1982) reviewed categorized landscape perception into four paradigms which are expert, psychophysical, cognitive and experimental paradigms. Daniel and Vining (1983) classified landscape assessment models into ecological and
formal aesthetic (or expert descriptive inventories), psychophysical, psychological and phenomenological models which are also called quantitative holistic techniques (The Macaulay Land Use Research Institute, 2005). In the meanwhile, this research has demonstrated that landscape preference is the important technique for measuring the relationship between human perception and landscape features and concluded that a unified landscape perception theory is required. In the literature, there are several theories related to the landscape perception study. Among them, Kaplan and Kaplan’s (1989) preference theory (Information processing model) was most cited and used.

4. People’s perceptions of surrounding environment are often influenced by several social and demographic factors. Thus, the landscape preferences varied in people’s past experience (Zube 1984; Kaplan and Kaplan 1989), the degree of familiarity of environment (Balling and Falk 1982, Kaplan and Herbert 1988), lifespan (or age) (Zube et al. 1983, Balling and Falk 1982), gender (Hull and Steward 1995; Ho et al. 2005), and education (Balling and Falk 1982; Kaplan and Kaplan 1989), as well as cultural variation (Kaplan and Herbert 1987; Yu 1994).

5. To study the relationships between people’s preference and the physical landscape features, more and more statistical methods such as regression analysis and factor analysis have been applied to the field of landscape preference study.
Research Motivation

As introduced in the landscape preference study context, the scene type of landscape preference study was restricted due to the research purpose. In the literature, a lot of effort has been put forth to investigate people’s perception towards natural verses urban landscape, and the different types of the outdoor spaces (Kaplan and Kaplan 1989; Chenoweth 1989). Recently, several preference studies focusing on the specific landscape, such as water, streetscape, and vegetation have been published.

However, there are very few publications of landscape preference related to the campus open space in the literature. There also seem to be little data of campus landscape components of open space on visual preference. In the book “People’s places”, Cooper-Marcus and Fancis (1990) studied the history of campus planning, provided a literature of campus open spaces and gave examples for study of campus outdoor spaces, as well as successful or unsuccessful campus open spaces examples. Some design recommendations for campus outdoor spaces were also given in this book. Abu-Ghazzez (1999) used a qualitative approach to study a group of 140 participants including students, faculty, and administrative staff and how they perceived the campus outdoor spaces at the University of Jordan located in Amman, and how such spaces support students’ outdoor activities through the behaviors study. Petherick (2000) studied the campus open space using Nasar and Fisher’s prospect-refuge model, which was developed from the Appleton’s (1975) prospect-refuge theory, to examine the perception and spatial behavior in relation to environmental design features on campus for the safety issue.
Campus open space as an urban landscape form is the built environment. Many students live four or five years on campus during their study at a university. The landscape on campus is the everyday experience to students. The certain landscape preference will influence the students’ behavior. Hull and Revell (1989) defined landscape and scenes as, “the outdoor environment, natural or built, which can be directly perceived by a person visiting and using that environment…” (pp.324). Studying the students’ preference of their surrounding environment aims to better apply for campus design issues. Much former research showed that people preferred the natural landscape to the built environment (Kaplan and Kaplan 1982; Zube et al. 1982; Kaplan 1984). This study aims to investigate how the natural landscape elements can be designed in the built environment-campus open space. In this study, the relationship of preference patterns and landscape features on campus open space will be investigated via studying groups of students’ perception of physical landscape settings. Ideally, the use of this preference pattern may be contributed to the future design and management of the campus open space.

This research also attempts to apply the Visitor Employed Photography (VEP) method to investigate students’ perception on the campus open space. The VEP method as a potential research tool for has not been widely applied to the study of landscape perception.


Research Purpose and Objectives

The purpose of this investigation is to add a study case to the current landscape preference study body. Through the study of the landscape preference patterns for open space around the drill field on Mississippi State University (MSU) campus among 83 students, this study attempts to investigate preference patterns and assess some important landscape features in explaining the landscape preferences for campus open space. The study will also examine whether the preference is influenced by gender, cultural background or majors.

In this study, Visitor Employed Photography (VEP) will be used as a dominant data collection method along with the pluralistic analysis methods. The methods of content analysis and multivariate statistical analysis---Biplot will be applied to reveal the preferences patterns for open space at MSU campus among a group of students.

The objectives in this research can be summarized as follows:

1. Explore the applicability of the Visitor Employed Photography (VEP) method in a landscape preference study;

2. Identify the most preferred scene type of open space around drill field on Mississippi State University (MSU) campus as identified by 83 students;

3. Identify the overall landscape preference pattern of the participating students;

4. Investigate the possible difference of the preference patterns between the student group of Landscape Architecture major (32 students) and the student group of general major students (51 students);

5. Investigate the possible difference of the preference patterns between the Chinese student group (33 students) and the American student group (50 students);

6. Investigate the possible difference of the preference patterns between the female student group (23 students) and male student group (55 Students).
7. Investigate what kinds of landscape elements and how they can strongly influence students’ preference pattern for campus open space.

**Organization of the Document**

The construction of this thesis includes five chapters.

Chapter I is the introduction of this study, and briefly identify the context of this study. The research context, the study motivation, purpose and objectives, as well as organization are introduced.

Chapter II provides a detailed literature review on the issues introduced in the Chapter one. The literature review has three major sections. The first section is an overview of landscape perception study in the broader issue of landscape assessment and evaluation. The models and methods applied in the landscape perception study are reviewed. The second section focuses on the details of landscape preference research, including the landscape preference theories, model and technique. The third section presents the literature review of landscape preference studies in different fields, including the preference study of natural landscape and the landscape preference study of built environment.

Chapter III describes the methods of this research in detail. Three research methods are applied in this study, including Visitor Employed Photography (VEP), Content Analysis, and a statistical analysis tool for Multivariate analysis---Biplot. In this research, the VEP serves as a major method for data collection. Therefore, a literature review of VEP composes the major section of this chapter. The method of content analysis is also introduced in this chapter, which will be used to transform the qualitative information
from the VEP data into quantitative data. Then, a statistical analysis tool for Multivariate analysis---Biplot is introduced for analysis of the transformed quantitative data.

Chapter IV presents the details of this study, including analysis results and findings.

Chapter V is the conclusion of this study, including the discussion of findings, the outlines of the limitations of this study and offers suggestions for future researches.

The organization of this thesis is summarized in Figure 1.1.

---

**Figure 1.1 Thesis Structure**
CHAPTER II

LITERATURE REVIEW

“The pattern concept can usefully be contrasted with the idea of a rule. A rule indicates what is to be done in a given situation. A pattern raises issues that may need attention and provides ideas and examples of what could be done to address them. Thus, while a rule bypasses people’s intuitions, a pattern calls upon these intuitions and attempts to educate and strengthen them in the process of solving the problem.” (Kaplan, Kaplan and Ryan 1998 pp.3)

INTRODUCTION

This chapter provides a background of landscape preference study. As one of the landscape assessment approaches, landscape preference has been integrated with landscape assessment. Studying the landscape assessment paradigms aims to investigate the proper models for the present landscape preference study. The theoretical base for landscape preference research is also reviewed in this chapter, as well as the applications in the field of landscape preference research.

Definitions in Landscape Assessment and Evaluation

Before the discussion of landscape assessment and evaluation, it is necessary to learn two important terms.
Landscape

In the existing literature, Hull and Revell (1989) defined the “landscape” as the visual properties:

“The outdoor environment, natural or built, which can be directly perceived by a person visiting and using that environment. A scene is the subset of landscape which is viewed from one location (vantage point) looking in one direction…” (pp.324)

Daniel and Vining (1983) identified the term of landscape which clearly focused upon the visual properties or characteristics of environment, including the natural, the man-made landscape features, physical and biological resources which could be identified visually. In 1980, Appleton stated that the meaning of “landscape” is similar with “environment”, but the landscape referred to the people’s perception and feeling (Appleton 1980).

Visual quality

Visual quality is important for both the natural and the man-made environment. In the literature, the objective definition of Visual quality is generally synonymous with scenic beauty, but intends to convey an impression of objectivity (The Macaulay Land Use Research Institute, 2005). The Visual Resource Management System and Scenic Management System used by the US Department of Agriculture (USDA) Forest Service is based on the notion of visual quality that use the term “visual quality” to establish a clear separation between peoples’ visual responses and non-visual responses to the landscape (Preston 2001).
The assessment of visual quality sometimes is based on the expert theory, and sometimes relies on the public surveys. Visual quality is “the character, condition, and quality of a scenic landscape or other visual resource and how public perceive it” (OCTA\textsuperscript{1}, 2006)

**Landscape Assessment and Evaluation**

Landscape assessment and evaluation research has been used for over 40 years. Landscape assessment theories and methods incorporate ideas and goals from the fields of design, ecology, and environment behavior. The major impetus of landscape assessment was in the area of systematic analyses of landscape quality toward the identification, management, and conservation of scenic resources occurring during the decade of the 1960’s and early 1970’s (Zube et. al. 1982). Landscape visual quality is now recognized by many researchers and designers, as well as government groups, as valuable and unique natural resources. It is considered as the obvious prerequisite in the landscape planning, design, and conservation field (Ovington et al. 1974; Wright 1974; Fabos & McgGregor 1979). To develop landscape policies related to landscape visual quality, research in various disciplines, such as forestry, geography, landscape architect, psychology, environmental studies and recreation has been conducted for assessing landscape visual quality. Numerous approaches were developed based on perceptual and

\textsuperscript{1}“OCTA” is the abbreviation of Orange County Transportation Authority, California. Orange County such as city, State, County, federal, and regional agencies provide guidelines regarding the preservation and enhancement of visual quality for scenic highway. (http://www.octa.net/lrtp2/4.13.Visual.pdf)
expert points of view for assessing landscape visual quality. Developing the quantitative assessment methods for measuring the contributions of specific landscape elements to overall preference is one of the important issues for landscape visual quality assessment (Buhyoff and Riesenmann 1979). A structured method of landscape assessment, linking description, classification, analysis and evaluation has been suggested for complete framework of landscape management and the process of decision making (Copper and Murray 1992).

During the 1960’s to 70’s, landscape assessment focused on producing “objective” and quantitative methods with the value for the “subjective” responses to the landscape quality (The Macaulay Land Use Research Institute, 2005). These methods were developed to consider as the tools to enable an evaluation by different observers which provided reliable and consistent information about observers’ responses to landscape visual quality.

Unwin (1975) described the landscape assessment and evaluation in three phases. The first phase is landscape measurement, which is an inventory of what actually exists in the landscape; the second is landscape value which is an investigation and measurement of value judgments or preferences in the visual landscape; the third phase is landscape evaluation in which the quality of objective visual landscape in terms of individual or societal preference for different landscape types can be assessed. Recently, numerous techniques of landscape assessment have been discovered and applied to research. There have been several key publications that classify and assess the overall the contributions in landscape assessment (Zube et al. 1982; Daniel and Vining 1983). In the literature, the
various landscape evaluation models are used to assess the landscape quality and theories underlying these techniques. Arthur et al. (1977) sorted the landscape assessment models into descriptive inventories and public preference models; both categories furthermore split into non-quantitative and quantitative methods. Crofts (1975) described two models of landscape evaluation techniques which are the preference model and surrogate component model. Briggs and France (1980) used direct and indirect methods to divide the models. Daniel and Vining (1983) divided the techniques into ecological and formal aesthetic (or expert descriptive inventories), psychophysical, psychological and phenomenological models, which in this category is called quantitative holistic techniques (The Macaulay Land Use Research Institute, 2005). Another review conducted by Zube et al. (1982) reviewed 160 articles and categorized landscape perception into four paradigms which are expert, psychophysical, cognitive and experimental paradigms. In this classification, the “ecological” and “formal aesthetic” models were combined into the expert (professional) paradigm. The “psychological” model belonged to the cognitive paradigm. According to the literature, the landscape assessment model system can be drawn (See Figure 2.1).

In 1984, Zube studied the themes in landscape assessment theory. In this research Zube synthesized the former overlapping landscape assessment models into three interdisciplinary paradigms toward unifying and developing the general theory in landscape assessment. The three paradigms are the professional, behavioral, and humanistic (Zube 1984). After reviewing many landscape perception researches, the landscape perception model and paradigms are most frequently cited and used.
Reviewing Zube’s classification of landscape assessment model, especially the psychophysical and psychological paradigms, is useful for further discussion in this thesis.

Figure 2.1 Landscape Assessment Models Classification System
Expert (Professional) Paradigm

This approach is based on the experts’ (professionals) assumption for assessment of landscape value. Those techniques involved the evaluation of landscape quality by experienced observers or skilled trainers (Zube et al. 1982), such as landscape architects, planners or landscape managers. They rate the various attributes of landscape that are assumed to have aesthetic relevance. The ratings are either based on descriptions or evaluative appraisals of scenic quality, but not intentionally personal preference. Carlson (1977) points out the professionals are more sensitive to the surrounding environment than the lay public and more qualified to judge the landscape aesthetic quality than non-experts. Chenoweth (1984) suggested the experts typically represent both the natural sciences or fine arts tradition and the environmental attributes chosen for training of the originators. Thus, “the formal aesthetic model” and “ecological model” are categorized into the expert paradigm by Daniel and Vining (1983) and Arthur et al. (1977) categorizes these approaches into the “Descriptive inventories” that mentioned above. The descriptive inventories, so called expert paradigm, that do not validate public’s perception and has the low reliability.

An example of formal aesthetic model is the Visual Management System (VMS) developed by the USDA Forest Service to evaluate the scenic resources for a land-management framework. The model assumed the landscape scenic quality related to the landscape diversity and variety (Daniel and Vining 1983). Three classifications of this model are defined as “land character”, such as mountains, foothills, and plateaus, “visual variety”, such as form, line, color and texture, and “sensitive level”, the landscape as a
visual and recreational resource viewed by public. A good example of the ecological model is Leopold’s “Uniqueness ratio” that illustrates a landscape assessment methodology based on the evaluation of river corridor (Leopold 1969). “Uniqueness ratio” model is the rating system used to calculate the ecological characteristics of a river landscape for evaluating the scenic beauty of the river. In this research, the high uniqueness does not refer to a high aesthetic value but to a high ecological value (Daniel and Vining 1983).

**Cognitive (Psychological) Paradigm**

The physiological model focuses on the meaning of landscape. Zube et al. (1982) suggested that the meanings associated with landscape properties were in parallel to people’s past experience, future expectation, and socio-cultural background. The major concept of the model is that human are thinking landscape who do not only respond passively to the environment stimuli (Taylor et al. 1987). The psychological approach has been applied in many researches that analyze people’s preferences for different landscapes. Taylor et al. (1987) point out the psychological model tries to find out why landscapes are valued, as opposed to what kind of landscapes are valued. Recently, several researches identified that the psychological model seeks to find the connection between subjectivity and objectivity and tries to offer a theoretical base for landscape aesthetic (Kroh and Gimblett 1992; Bitar 2004).

The model used for studying landscape aesthetic is based on the feelings and perceptions of people. A high quality landscape can evoke human’s positive feelings, such as security, relaxation, warmth, or happiness; a low quality landscape is associated
with the negative feelings, such as stress, fear, or insecurity (Daniel and Vining 1983). The method analyzes the people’s perception based on people who experience or use the landscape. The psychological approach, such as preference scoring of photographs, uses more than one observer of photographs and obtains one or more quantitative scale values for every assessed landscape. Therefore, this method is more valid and reliable than the expert model (Daniel and Vining 1983).

A series of studies conducted by Kaplan (1972, 1979, and 1987) demonstrated that various psychological constructs, “complexity”, “mystery”, “legibility”, and “coherence” are important predictors of human landscape preferences. These studies illustrate the cognitive model. The studies initially attempt to identify psychological variables on photographs of landscape, then preferences ratings for landscape made by lay-publics (Daniel and Vining 1983). Another study by Ulrich (1977) used the psychological model combined with the psychophysical model to study roadside scenes. A series of photographs were evaluated by groups of observers using the preference ratings. The researcher set three dimensions of landscape: 1) complexity, coherence and depth; 2) focality, texture, and mystery; 3) this study found that the preference is positively related to focality, homogeneous ground texture, depth and mystery (Bitar 2004). Recently, Galindo and Rodriguez (2000) studied the urban landscape in an attempt to identify several main affective responses related to aesthetic judgments of urban landscape. They found that the results supported the Kaplan and Kaplan’s (1982) informational model of landscape preference (Galindo and Rodriguez 2000).
**Psychophysical Paradigm**

In this paradigm, the psychophysical model is seeking to determine mathematical relationship between landscape physical features, such as water, topography, vegetation, and perceptual judgments of human observers (psychological responses), especially landscape perception judgments, aesthetic value, and scenic value (Daniel and Vining 1983; Uzzell 1991). Zube *et al.* (1982) pointed out, “the external landscape properties are assumed to bear a correlated or stimuli-response relationship to observer evaluations and behavior” (pp.16). The model evaluates the landscape quality by the public or the interested groups rather than experts. The most direct way is to ask lay public about what they find appealing (Taylor *et al.* 1987). The landscape elements are identified by the public and the perceptions are related to landscape, thus the landscape can be better managed.

In the literature, using this model for landscape evaluation is usually combined with statistics measurement of people’s perception of landscape quality. The statistic method, such as regression analysis, is frequently used by researchers to determine the relationship between landscape features and people’s perception (Buhyoff *et al.* 1994). Various techniques within this model are used to evaluate the landscape quality and transform the data from qualitative landscape to quantitative landscape. Typically, researchers require participants to rate their preferences with interval scales of measurement. For example, in the well-known Scenic Beauty Estimate method (SBE) developed by Daniel and Boster (1976) ask subjects to do the preference rating for different landscapes on a scale of 1 to 10 (Smith 2002). The research conducted by Shafer...
and his colleagues illustrated the psychophysical model also. They used the factor analysis and regression techniques to rate landscape preferences by measuring the areas, perimeters, and tones of landscape zones of photographs (see also Shafer, 1969; Brush & Shafer, 1975). Shafer’s early work provided a systematic approach to rating the landscape components to preference (Arthur et al. 1977). The work by Hull, Buhyoff and Cordell (1987) apply the psychophysical model to study the scenic beauty perception of roadside pine tree. They took photographs from three different sites and provided the sufficient variability for creating the realistic models. The forest characteristics, such as tree density, tree age, height, and tree per acre etc. were the measurements to predict scenic beauty. The SBE scaling method and the regression analysis also were applied in this research. The authors point out,

“Interpreting psychophysical relationship helps establish model validity identifies testable hypotheses, and generates information useful to future model development, theory building, and design effort.” (Hull, Buhyoff and Cordell 1987, pp.113).

The psychophysical model puts most emphasis on forest landscape planning and management (Daniel and Boster, 1976; Shafer & Brush 1977). Some researchers studied the rural and urban landscapes (Schroeder and Daniel 1981; Schroeder 1991), outdoor recreation settings (Kaplan 1974; Ulrich et al. 1991), as well as natural verse man-made landscapes (Wohlwill 1979). The techniques of this model have had an advanced development. The photographs as stimuli or surrogate for the environment are the major technique to many psychophysical or psychological researches. Recently, video imaging, computer simulations, 3D modeling, many alternative techniques have been used by researchers.
Experiential Paradigm

This paradigm aims to study the interaction between humans and landscape (Zube et al. 1982). The research concentrated on individual human experiences, subjective feelings, expectations and interpretations of everyday landscapes (Tuan 1995; Ohta 2001). Daniel and Vining (1983) also included the phenomenological model in this paradigm. They point out the landscape perception is the conceptualization between a person and the landscape or landscape properties. The research focused on very particular personal, experiential and emotional factors to interpret the surrounding landscape as opposed to visual properties of the landscape. The experiential research usually is not to be used to rank landscape in terms of scenic beauty and the paradigm presents the subjective determination of related landscape (The Macaulay Land Use Research Institute 2005). The experiential approach is usually combined with other research models, such as the cognitive model or psychophysical model, to provide valid and reliable quantitative and qualitative data. In the literature, the research in experiential preference has been limited to the built environment (Lynch 1960; Lowenthal 1972). Most studies within this paradigm focus on the landscape development and the perception of landscape hazard. There are few studies devoted to assessing the natural landscape.

The major methods of this paradigm are personal interview, content analysis and verbal questionnaire. The detailed interviews and open-ended surveys and focus groups are also used to collect data. Content analysis is used to identify common experiences based on the collected data (Daniel and Vining 1983).
A study by Seamon (1979), the example of experiential research, predicted the environmental preference to identify the important habit behavior. The study focuses on assessing the significantly individual perception of particular landscape settings. This research employed an interest group to discuss the experience of particular landscape in the open forum. It is very subjective as opposed to an objective measure of people’s general response of landscape features. Seamon’s study is the pioneer for later work on local community preference research to identify a particular meaning of the local landscape for the community (Swaffield and Foster 2000). A study by Schroeder (1991) applied both psychophysical and experiential models to study public preference for landscape scenes of an arboretum. Open-ended mail-out questionnaires and content analysis were used in the research. The author found that the combination of psychophysical and experiential approaches could conduct both quantitative and qualitative data and provided more information for understanding people’s perception and experience of arboretum landscapes, rather than only experiential approach. The work of Bishop and his colleagues (Bishop 2001; Bishop et al. 2001) also employ the experiential approach in their landscape preference research of virtual environments.

**Relationship of Four Paradigms**

Four paradigms as shown above, deal with the concept of landscape and with landscape perception. Research based on expert paradigm treat the human as a passive observer. The dimensions of landscape include land form, land cove and culture features. The psychophysical paradigm involves human as respondents and tries to find the relationship between individual landscape features and observers’ perception. The
dimensions usually include the scenic beauty, aesthetic quality, or landscape preference. The cognitive paradigm (psychological approach) focuses on the meanings of physical landscape features associated with people’s perception. The experiential paradigm (phenomenological approach) concentrates on the interaction of humans and landscape. This approach treats humans as the active participants and views landscape as a holistic phenomenon. The four paradigms can be illustrated in Table 2.1.

Zube et al. (1982) clearly drew the relationship of these four paradigms in their research after reviewing 160 articles. They pointed out “the relationship of four paradigms indicates the potential for the development of an integrated theoretical framework” (pp.37).

Table 2.1 Spectrum of Paradigms (Adaptation from Zube et al. 1982)

<table>
<thead>
<tr>
<th>Paradigms</th>
<th>Experts</th>
<th>Psychological</th>
<th>Cognitive (psychological)</th>
<th>Experiential (Phenomenological)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human</td>
<td>Passive</td>
<td></td>
<td></td>
<td>Active</td>
</tr>
<tr>
<td>Landscape</td>
<td>Dimensional</td>
<td></td>
<td></td>
<td>Holistic</td>
</tr>
</tbody>
</table>

Zube et al. (1982) also confirm that there is no individual paradigm that can meet all needs of landscape assessment. According to zube et al. (1982), the common sharing concept for studying landscape perception can be found among four paradigms (See Figure 2.2).
In 1984, Zube’s research, “Themes in Landscape Assessment Theory”, pointed out the lack of theoretical framework of landscape assessment and tried to unify the theory. Zube categorized the former researches into professional, behavioral, and experiential paradigms. The former psychophysical model and cognitive model (Zube et al. 1982) are included in the behavior paradigm (Zube 1984). Zube (1984) suggested the professional paradigm has low reliability but high utility; the behavior paradigm based on empirical study has high validity and reliability; the experiential paradigm is lacking in validity and reliability, but in demonstrated utility. Understanding this relationship and some shortcoming of these approaches can be better applied for the future research.
Landscape Perception Model

The four distinct paradigms can be unified into one model which is the landscape perception model (Zube et al. 1982). (See Figure 2.3). Based on the work of Ittelson (1973), who offers the nature of humans - landscape interactions and the outcome, the model developed by Zube and his colleagues (1982) consider the landscape perception as a function of interactions between humans and the surrounding environment. According to this model, Zube et al. (1982) placed 160 researches into one system of landscape perception; also identifying four paradigms for the future study.

![Landscape Perception Model Diagram]

Figure 2.3 Landscape Perception Model (Zube et al. 1982)

Zube et al. (1982) suggested that the model “illustrates this process and provides a variety of elements that help to define the components …it also provides hints about the direction of future research” (pp.22). The landscape perception model shows the
interactions of humans and landscape and outcomes of the interaction. Zube et al. (1982) suggested that:

“understanding interactions will contribute to answering the questions of why landscapes are perceived as they are, what they mean to individuals and groups and how they contribute to one’s sense of well being or quality of life”. (pp.22)

Landscape Preference Research

Before reviewing the landscape preference researches, the definition of landscape preference should be stated here. In the literature, the definition of landscape preferences is defined by US Forest Services (1995). The research based on people’s perception study landscape aesthetics. Sheppard (2005) summarized the landscape preferences definition that landscape preference directly measured the perception from people or viewers. Strictly, landscape preference expresses the people’s taste of landscape, such as “like” or “dislike”. Generally, landscape preference studies the “attitudinal belief, values, various responses indicating how people react to landscapes” (Sheppard 2005). The typical products of landscape preference research are the preferences related to measurable factors of qualified or classified landscape features; maps of preferred areas and features; photographs of preferred scenes and conditions (Sheppard 2005). Landscape preference is an attitude that the study is based on people’s perception of surrounding environment. This attitude not only come from landscape stimuli, but also is influenced by psychological and psychophysical reactions of people associated with personal, social, experience, and cultural factors.

Nowadays, landscape preference is an approach to study the perception of human beings associated with the surrounding environment. In landscape assessment research,
landscape preference is the important method for measuring the relationship between people’s perception and landscape features. As mentioned above, in the literature, landscape evaluation has three phases (Unwin 1975). The first step is the inventory of what exactly exist in the landscape, the second and the third step try to investigate the visual preference, and then assess the visual quality in terms of the individual or the societal preference for the different landscape types. Therefore, landscape preference as the important measurement in terms of landscape perception study has been applied for the different landscape research fields, such as natural, rural and urban landscape. Preference test as a technique was widely used in psychological, psychophysical, and experiential researches (Chenoweth 1984).

The earliest landscape preference technique (Shafer et al. 1969) used black and white photographs for identifying the quantifiable landscape variables to predicting the aesthetic quality. Landscape variables were identified based on the dimensions of landscape zones. Ten zones were identified and each zone was described by perimeter, interior, area and shape. The factor analysis and multiple regression technique were applied to investigate the relationship between the objective measures and the landscape quality. A similar technique was used by Zube et al. (1974). The fifty-six color photographs were used for predicting the scenic resource values. This landscape preference technique was identified by Fenton and Reser (in Nasar 1988) as the “objective quantification” approach for measuring the objective physical setting variables to predict the landscape preference.
Another landscape preference technique was that the investigators were depending on human judgments of landscape for assessing dimensions of environment (Wohlwill 1976). Wohlwill (1976) described that this technique used the judges’ ratings to define the landscape variables with the landscape referent principles.

The phenomenological descriptions for identifying the landscape physical variables were not widely used in the study of landscape preference. Fenton and Reser (in Nasar 1988) noted that this approach “is particularly important to the description of the landscape variables that may have a ‘psychological impact’ (Kaplan 1975) on the individual’s perception of landscape quality” (pp.114). Dunn (1976) used this approach to investigate what variables are important in landscape preference through the content analysis of people’s responses. The phenomenological model was mentioned in the experiential paradigm. The content analysis, verbal associations, and open-ended questions are used to identify the landscape variables which are perceived by individuals.

**Toward Landscape Preference Theories**

In the literature, several researches concluded that studying landscape perception need a unifying theory (see Appleton 1975; Zube *et al.* 1982; Zube 1984). Porteous (1982) states that many researches related to landscape assessment is “rampantly empirical” and the theories are poorly developed (quoted from Zube 1984). Zube *et al.* (1982) tried to categorize the various disciplines and the diversity approaches in the field of landscape assessment into four paradigms that are unified by one system called landscape perception model. Zube (1984 pp.105) suggested that two terms, “landscape” and “theory,” share “a degree of ambiguity” that is manifest in the many definitions.
However, he drew the difference of the meaning of theory among social and behavioral sciences, landscape design and planning, and management professionals. The social and behavior scientists see theory as an “explanatory” context and aim to determine “what” and “why” to explain and predict a phenomenon. The landscape designers and the planners try to develop the normative models to determine “what ought to be” (Zube 1984). Zube referred to Moore’s (Moore et al. 1982) four-level structure of theory which identifies “theoretical orientations”, “organizational frameworks”, “conceptual models” and “explanatory hypotheses” to bridge the apparent differences of the theories as the basic attributes of theory in landscape perception research (pp.105). Zube (1984) also unified the different disciplines in landscape assessment research into three themes, “professional paradigm, behavioral paradigm, and humanistic paradigm”. Furthermore, Zube(1984 pp.105) suggests several issues for the future theory development that the theory should:

1. Provide a framework for bridging the various disciplines; contribute to landscape assessment and understanding the interaction between human and landscape;

2. Consider relationships between quantitative and qualitative information and;

3. Include interests in both urban and natural landscapes at both the site and regional scale.

In the literature, there are several theories related to the landscape perception study. The Gestalt psychology theory offers a strong foundation for the cognitive theory. The theory views the landscape as a whole when people perceive landscape. The key point of this theory is the idea of grouping. People perceive the landscape as a pattern, not the separate items. A part of the ecological theory of perception is “affordance theory”
developed by Gibson (1977). Gibson (1979) explained that “affordances” are what the environment offers in terms of “what it provides or furnishes, either for good or ill” (pp. 127). Kaplan (1979) further explained that

“Perception is viewed as not merely dealing with information about the environment, but also yielding information about what the possibilities are as far as human purposes are concerned.”

The affordance theory offers the researchers understanding of people’s preference of perceived environment related to the function as well. There are two evolutional landscape perception theories closely related to the landscape preference research that are the “prospect-refuge theory” (Appleton 1975) and the “Information processing model” (Kaplan and Kaplan 1988). In this thesis, these two theories are further discussed.

**Prospect - Refuge Theory**

Prospect-Refuge theory was first described in *The Experience of Landscape* (Appleton 1975). Appleton (1975) suggested that “prospect-Refuge theory” as a “Habit Theory” would guide the other theories about the role of aesthetics for selecting habitats. The prospect-refuge theory was first introduced as an explanation of human environment preferences. Appleton (1975) suggested that humans preferred the landscape settings with the prospect-refuge due to the fact that “the ability to see without being seen is an intermediate step in the satisfaction of these needs, the capacity of an environment to ensure the achievement of this becomes a more immediate source of aesthetic satisfaction” (pp.73). Prospect refers to the ability of humans to gather information and evaluate it, then decide how to use it. Refuge refers to the degree to which an environment provides the security for people to explore it and gather the information.
This theory offers two opportunities which provide humans with an opportunity to see (or prospect), without being seen (or refuge), provide aesthetic pleasure because they contribute to the satisfaction of the observer’s evolutionarily ingrained biological needs (Appleton 1975). Savanna-like landscapes offer such two opportunities “prospect” (open grasslands) and “refuge” (forest edges or groups of trees) qualities that were preferred the dwelling place by our ancestors.

Some researches use Prospect-refuge theory to interpret people’s preferences for the safety issues. For an example, Petherick (2000) suggested that the safety issue on campus that “the individual would feel most safe in the areas characterized by high prospect with low refuge” (pp.104).

**Information Processing Model**

“When our ancestors came down from the trees to face the rigors of the African savanna, they were not some random, undifferentiated mammal. They came with a distinctive pattern of adaptations that reflected the requirements of the particular environment from which they emerged.” (Kaplan and Kaplan 1982, pp.7)

This statement showed that our ancestors depend on the cognitive information processing skills that led to preferences for certain landscapes. The information-processing model was developed by Kaplan in 1979. The model tried to predict and describe people’s preferences for landscape. Kaplan (1979) stated that there were two underlying purposes that lead researchers to understanding people’s preferences which were “making sense” and “involvement”. These two purposes are concerned with during the day-time. Kaplan (1979) suggested that “making sense” concerns the need to comprehend in the immediate environment. People prefer the certain landscape according
to how much they can immediately understand what is going on. Ulrich (1977) stated that, “to be preferred, a scene should not only present information, but it should also be identifiable and easily grasped. Conversely, a scene that is ambiguous and resists identification, or which places very high processing demands on the observer, should be less preferred” (pp.280). Another informational need, Kaplan (1979) explained that “involvement” concerns the need to figure out, to learn, to be stimulated. The more involved an environment is, the greater the preference for it. Kaplan (1979) suggested that if the environment can meet the people’s needs (or purpose), by both “making sense” and “Involvement”, then such an environment would be preferred by people. Kaplan (1979) also pointed out “making sense” and “involvement” had paralleled in the general psychological literature, such as order, security, closure, curiosity, stimulation and challenge, etc (Kaplan and Kaplan 1978). In the later research, Kaplan and his colleagues (1998) named two informational needs as “Understanding” and “Exploration”. They further explained that “understanding” and “Exploration” are people’s basic needs. The organization of the elements and the contents in an environment can make a difference in people’s capability to meet their needs (Kaplan, Kaplan and Ryan 1998). In their research, they used five-point preference rating relying on the photographs and the slides of the difference places. They found that people preferred the well-organized space with focal landscape elements as opposed to either large expanses of land or too much vegetation and obstructed views.

Furthermore, Kaplan (1979) identified two different ways which people are relating to the visual informational needs. The first is “Visual Array”, the two dimensional pattern.
The second is “Three-dimensional Space”. “Visual Array” is the immediate visual information that can be thought of as a two-dimensional pattern which is seen in a photograph. “Three-dimensional space” predicts or infers the unknown information by a given scene. From above, the four predictors of preferences, “Coherence”, “Complexity”, “Legibility” and “Mystery”, were identified by Kaplan (1979) within the “Preference Matrix” (See also Kaplan and Kaplan 1982; Kaplan, Kaplan and Ryan 1998). The “preference matrix” within the “information processing model” can be summarized in the following matrix (Table 2.2).

Table 2.2 Information Processing Model (Kaplan 1979)

<table>
<thead>
<tr>
<th>Level of interpretation</th>
<th>Making sense (Understanding)</th>
<th>Involvement (Exploration)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual array (Two-dimensional), also thought of as the immediate</td>
<td>Coherence</td>
<td>Complexity</td>
</tr>
<tr>
<td>Three-dimensional space, also thought of as inferred, future or predicted</td>
<td>Legibility</td>
<td>Mystery</td>
</tr>
</tbody>
</table>

The explanation of four predictors can be found in the research of Kaplan (1982), Kaplan and Kaplan (1989), Kaplan, Kaplan and Ryan (1998). Based on these researches, “Coherence” refers to the order and level of direction of attention and how the scene “hangs together”. Kaplan (1979) explained that a scene identified as “coherence” may include the repeated elements, smooth texture, or readily identifiable components. “Complexity” refers to the amount of the diversity of the visual elements presented in the scene which people are interested in seeking how much is going on in the scene. “Legibility” refers to how the environment can be functioned and whether people can
understand the environment immediately and explore it without getting lost. Kaplan (1979) explained that legibility is a prediction and interprets the space with finding one’s way to go into space, and with finding the way back. “Mystery” refers to the promise of learning more information in the scene by further walking into it. “Mystery arouses curiosity” (Kaplan 1979).

Other researches also have the findings about using four predictors to explain people’s preferences of the environment. Kaplan’s (1987) research found that coherence was the more important preference predictor than others. The earlier research on roadsides and prairie reconstruction found that “mystery” as a predictor of the preference had a high rating; following were coherence and complexity. Mystery and coherence as the predictor of the preference were rated highly in past studies of natural environment, such as forests and wetland, while complexity was not an important predictor of preference. Herzog and Leverich (2003) tried to prove that legibility was an effective predictor of the landscape preference. But through the research, the author found that legibility had been an ineffective predictor of the environmental preference primarily because of its correlation with another predictor, coherence. Legibility had a slightly stronger correlation with preference than coherence. The author also suggests that the visual access is a major component of legibility in forest settings. In the urban settings, earlier research by Lynch (1960) suggested that “legibility is the ease with which a city’s parts can be recognized and can be organized into a coherent pattern” (pp.2). He asserts that legibility is “crucial in the city setting…” In the recent work by Duarte (2000), in the man-made environment,
complexity (more types of landscape components) predicts a high preference for the streetscape.

The four important environmental preference predictors (Coherence, Complexity, Legibility and Mystery) provide the information to understand why people prefer such environments and how comfortable people are in one place. Thus, meeting informational needs is the way that environment can be designed and managed (Kaplan, Kaplan and Ryan 1998).

Factors Affecting Landscape Preference

People’s perception of the surrounding environment also is influenced by several social and demographic factors. Thus, the landscape preferences varied with people’s past experience (Zube 1982; Kaplan 1989), the degree of the familiarity of the surrounding environment (Balling and Falk 1982; Kaplan 1989), lifespan (or age) (Zube et al. 1983; Balling and Falk 1982), Gender (Hull and Steward 1995; Ho et al. 2005), and education (Balling and Falk 1982; Kaplan and Kaplan 1989), as well as cultural variation (Kaplan and Herbert 1987; Yu 1994).

Kaplan (1989) summarized three major themes that should be considered in the study of the landscape preference in different groups. The first is familiarity, residential experience; the second is cultural, sub-cultural and ethnic; the third is formal knowledge and expertise. Balling and Falk (1982) found that children (under 11-year old) with less environment experience showed the innate inclination to favor some landscapes while the older people showed the preference associated with their past experience and the culture conditions. In this research, Balling and Falk (1982) also showed that foresters, who were
familiar with the natural environment, had a high preference to the environment among a
group of participants. An example of age-related research, Balling and Falk (1982) found
that the different preference significantly related to the age factor. The preference can be
changed by the experience of lifespan. Zube et al. (1983) found that (1) young children
(age 6-10) have distinct preferences for scenic quality in natural landscape; (2) high
naturalism was an important landscape component for young (age 12-19) and middle
aged adults (age 19-65) while it was less important for young children and elder people
(age over 65); (3) the complexity of landform was an important landscape characteristic
for young and elder adults but not for children; (4) children showed a high preference for
water. The evidence in the gender-related preference difference can be found in the
recent research of Ho et al. (2005) for studying urban park preference of different ethnic
groups. They found women and men have preference differences for various park
characteristics, but more important differences were found among the six ethnic groups.
They found “women prefer open space with a high degree of visual access” (pp.299).

Education influences landscape preference. Ryan (2000) found that students who major
in landscape architecture and environmental professionals have different preference for
open space from the public. Several studies also show the cultural issues as a factor that
influences the landscape preference. Nasar (1983) also suggested that the cross-culture
comparison could provide “further insight into nature of environment preference” (pp.
260). Kaplan and Herbert (1987) studied landscape preferences for natural settings. The
study was to compare the cross-cultural (American students vs Australian students and
The Australian Wildflower Society) and the sub-cultural (Australian students vs The
Australian Wildflower Society) factors by analyzing the perception categories and the preference levels. The research drew the conclusion that the preferences study might considered the cross-cultural differences. Yu (1984) showed that landscape preference was significantly influenced by cultural background. In this research the author used two groups of people which were 28 Chinese groups (landscape architects, horticulturists, college students, middle school students, workers, farmers) and a western expert group (Harvard design graduate students). The research also found that the education level (associated with age) and the living environment (rural vs urban) were powerful factors for the landscape preference. In the urban scene categories, Nasar (1983) studied the visual preference in urban street scenes between Japanese and American. The author selected several characteristics of the visual environment related to the preference for the urban scenes, such as novelty, complexity, order, naturalness, and openness ect. This study aimed to find out whether two group participants (Japanese graduate students and American graduate students) with different cultures and languages shared a common preference for each characteristic of the street scene in both of these complex and industrialized countries. With the different cultural backgrounds, the author found a difference of the preference between the two groups of students, but in the meantime, they did share a common preference for some urban street characters. And the preferences relate to familiarity and education factors as well. Interestingly, in this research, the author found that both Japanese and American students preferred the foreign (novel) scenes to their native (familiar) scenes (Nasar 1988).
**Expert Judgment versus Public Preferences**

In the literature, the landscape preference between experts and non-experts was found significant perceptual differences within many empirical studies. Kaplan (in Nasar 1988) noted that “although experts are invaluable when used appropriately, they are a dubious source of ‘objective’ judgments about what people care about in the landscape” (pp. 54). There have been numerical researches to argue that landscape perception should rely on lay-public (Robinson et al. 1976; Buyhoff et al. 1978; Kaplan and Kaplan 1982). As mentioned earlier, in the expert paradigms there have been many researches based on experts’ opinion to judge people’s perception of the surrounding environment. Experts, such as the landscape designers, landscape planners, and landscape managers are familiar with different disciplines about the design and the management of environment. Thus, they have quite the different perceptions to judge the value of the visual quality of the landscape. Kaplan and Kaplan (1982) suggested that experts could achieve high levels of consensus due to former training. Carlson (1982) argued that the lay-public lacked the experiences, trainings and the knowledge about the environment required to be fully sensitive to aesthetic quality. However, Arthur (1977) argued that the implied relationship between the professional and the public standards of scenic quality must be demonstrated and not assumed.

Somehow, the lay-public’s visual reactions are often ignored by experts in the practice during the visual assessment studies and the decision-making processes. Sheppard (1989) noted that, the expert based decisions on the visual impact were made based largely on their own professional judgments. Robinson et al. (1976) suggested that it was necessary
to recognize the difference between the public preference and the expert judgment, and decide which type of the opinion should be used as the criterion for assessing visual quality. The public preference is an opinion that specially relates to a personal “liking” or “disliking” based on people’s experience.

In the literature, many empirical researches showed the different preference between the lay-public and the experts (Yu 1984; Ryan 2000). The expert paradigm has been demonstrated that it has great utility, but low reliability (Zube 1984). To encourage public participants to involve in the landscape preference research, the researchers may obtain valid and the reliable data, and therefore both the qualitative and the quantitative landscape can be analyzed.

The arguments whether the assessment of the visual quality should rely on the lay-public or the experts may still go on in the future. But this thesis studies landscape preference according to the lay-public opinion to assess visual quality and an aim to enrich the body of landscape preference studies based on the lay-public’s input. Visitor employed photograph as the main research method in this thesis will be further discussed in Chapter III.

*Landscape Preferences of Natural and Urban Environment*

A number of the researches focus on the natural environment during the 1960’s to 1980’s (Zube *et al.* 1982). The natural environments include the forest and the rural landscape. The majority of the environmental perception and the preference studies have mainly focused on large-scale rural and the natural environments (Shafer, 1969; Daniel and Boster, 1976; Zube, 1976; Schroeder and Daniel, 1980). Kaplan and Kaplan 1989)
wrote an influential book “The experience of Nature”, that summarized the various preference studies for the natural environment. Numerous researches found that people prefer the natural environment to the man-made landscape (zube et al. 1982; Kaplan 1984). The researchers investigate the natural elements and whether they improve the visual quality of urban environment (Stamps 1997). However, the literature on the small-scale urban environments does exist (Anderson and Schroeder 1983). This literature takes many forms, contributes directly or indirectly to the development of a conceptual framework for the environmental perception and the preference research on urban park landscapes, and other types of open spaces and falls mainly under the psychophysical and/or cognitive paradigm (Bitar 2004). Recently, several studies researched the specific landscape features within urban environments, such as water (Yamashita 2002), street trees (Wolf 2005), and streetscape (Duarte 2000; Wolf 2005) and investigate landscape preferences of these physical landscape elements. Landscape visual quality is important especially for the living environment. Lozano (in Nasar 1988) noted that “although the methodology to introduce visual inputs in the design process is poor and inadequate, the visual qualities of built environment are extremely important” (pp.395).

There is a limited research of the landscape preference on campus open space. As stated earlier in Chapter I, this research will investigate the relationship between students’ perception and the physical landscape elements on campus open space. Therefore, this thesis is an empirical study and aims to enrich the body of landscape preference study for the built environment.
The literature review provided the background of the landscape preference researches, as well as the landscape assessment study. As an approach of the landscape assessment, the landscape preference theories and the techniques were developed by many researchers. Kaplan and Kaplan’s (1989) information processing theory will be applied for this study. To study people’s perception of the surrounding environments, Visitor Employed Photography can be a valuable research tool for studying the public’s perception. The statistic tool will apply to analyze the relationship between the perception and the landscape features. The proposed methods will be further discussed in Chapter III.
CHAPTER III
PROPOSED RESEARCH METHODS

INTRODUCTION

In this study, Visitor Employed Photography (VEP) is used as the dominant method for the data collection. This chapter will introduce the VEP method in detail, including its development, modification and application. Furthermore, the methods of content analysis and multivariate analysis---Biplot are also introduced in this chapter.

Visitor Employed Photography (VEP)

As a visual preference measurement method, VEP is a technique which involves the collection of public perceptions of the landscape by distributing cameras to respondents, and asking them to photograph the landscape that relate to the research objectives (Chenoweth 1984). The VEP method has been used successfully in understanding landscape aesthetics, outdoor recreation experience, and community planning (see e.g., Cherem and Driver 1983; Chenowith 1984; Hull and Stewart 1992; Taylor, Czarnowski and Flick 1995; Mackey and Couldwell 2004).

Author et al (1977) and Chenoweth (1984) placed the numerous landscape assessment methods for collecting data into three broader categories: descriptive inventories, surveys and questionnaires, and preference tests. “Descriptive inventories” can refer to expert
paradigm and “survey and questionnaires” can reflect psychological paradigm. The preference test, Chenoweth (1984) noted, “is distinguished by direct requests that as observers to select preferred landscapes of scenes among known pre-selected alternatives. Preference techniques could reflect any except the expert paradigm…” (pp.138). VEP is the technique for the preference tests that rely on evaluations obtained from the lay-public for the high valid and reliable data rather than expert.

**History of VEP**

The original work of visitor employed photograph can be traced back to Cherem and his associates as a method for the collection of public images of landscape. In 1970, Cherem and Driver conducted a preliminary study of VEP at University of Michigan. Unfortunately, the study was not published because respondents took some consensus photos, and respondents from different academic backgrounds tended to focus upon different visual topics and expressed their professional focus in taped with those photos (Cherem and Driver 1983). In 1972, based on the former study, Cherem and Driver applied the VEP method again for studying the perception of nature trails in southeastern Michigan. With the success of this research, the VEP method was first introduced to landscape architects. From then on, VEP became “a potential tool for landscape architecture and is worthy of future exploration” (Chenoweth 1984), for “determining landscape perception which involved users of perceptual resources” (Estepa 1999) and helping to quantify the perception of landscape. In 1980, the adaptation of VEP was developed and modified by Thompson’s study of Lower St. Croix (Thompson 1980). The modification to VEP made by Thompson was to provide respondents with a map asking
them to identify not only the location but the direction of each photograph taken (Estepa 1999). In 1982, additional modification to the VEP technique was made by Chenoweth and Miemann in the study of the Lower Wisconsin River and Alpine Lakes. The pre-stamped return envelope and the engraved camera were provided to participants (Chenoweth 1984). Comparing the original application of VEP and Thompson’s study, the instructions in this study provided by the researchers were interested in those features that “added to or detracted from the resource users’ experience of scenic beauty” (Chenoweth 1984). After a fastigium of using VEP in the later 1970s and early 1980s, the VEP method had received little use for over ten years (Chenoweth 1984). In 1995, a noted addition was made by Taylor, Czarnowksi, Sexton and Flick’s study of the “Importance of Water to Rocky Mountain National Park Visitors” (1995). In this study, the mailing survey was first used to support the VEP method for collecting data.

Currently, VEP has been used successfully with other methods in the landscape research, such as heritage landscape assessment, farm preservation, and tourism study. Initially, most VEP research focused on landscape, rivers, nature/hiking trails and natural scenic beauty. However, Cherem and Driver also recognized its accessibility for measuring human perceptions in constructed environments. Cunningham and Jones (1999) used VEP as a research tool with children to investigate playground activity patterns and preferences. The results informed area and equipment planning decisions (Mackay and Couldwell, 2004). This study is the first experience using VEP to understand children’s perception of playgrounds.
More Examples of VEP Applications

In 1999, a broader community planning application was illustrated by Hawkins et al. who provided cameras to residents of a community and assigned them the task of photographing the best and worst aspects of their hometown. This is the first application of VEP in the community planning. The visual exercise achieved unprecedented community involvement in local planning, and the photographs were used as a decision-making tool for community initiatives (Hawkins et al. 1999). Estepa (1999) applied the VEP method to investigating open space preferences of seniors and finding out why seniors more prefer “vegetation” and “water” on the open space, as well as open green space. In this research, VEP was well reviewed by author and content analysis also was applied to this research. Compared to other visual assessment method, the essence of VEP is that the observer themselves rather the professionals, select those areas or aspects of environment for which they will provide information, and the response made by observers are responses to the actual landscape at the time they are experiencing the landscape, either of the aesthetic effect of landscape on the observer or of the outcome of interaction between the observer and the landscape.

In 2004, Mackay and Couldwell used VEP to understand visitors’ images of various tourism environments and attractions. The researchers’ study of a heritage site applied the VEP method along with focus group to investigate destination image in tourism analysis. “Results provide initial support of usefulness of VEP to generate images of a tourist attraction and to facilitate meaningful practical integration of visitor-determined images” (Mackay and Couldwell 2004, pg.390). Tunstall, Tapssl and House (2004) used VEP to
study children’s perceptions of river landscape and play. This is an example of using children’s photographs to help researchers understand the river landscape and play opportunity for children (Tunstall, Tapssl and House, 2004).

In this study, the reason why the VEP method used as the major data collection method can be addressed in three aspects. First, photographs are the most common visual stimuli used in the study of preferences. They are used to gain understanding of people’s perception of their environment through photographs that were taken. Second, VEP, as a visual measurement method, the photographs were taken by respondents rather than the investigator or landscape planner, which the information was provided by the lay public. Hence, the results from VEP are not just the opinion of experts, but can represent the majority. Third, the responses made by the observers are responses to the actual landscape at the time they are experiencing the landscape (Taylor, Sexton and Czarnowsk 1995).

**Content Analysis**

Content analysis has been defined as a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding (Stemler 2001). In 1969, Holsti used this to offer the broader definition of content analysis as: "any technique for making inferences by objectively and systematically identifying specified characteristics of messages" (Holsti 1969, pg.14, Stemler 2001). Under the Holsti definition, the technique of content analysis is not restricted to the domain of textual analysis, but may be applied to other areas such as coding student drawings, or coding of actions observed in videotaped studies (Stemler 2001). It is either
a qualitative or a quantitative method and the researchers who apply such techniques can
design it into a qualitative, a quantitative, or a combination of both qualitative and
quantitative data analysis methods. Sommer and Sommer (1997) explain that, “the basis
of a content analysis is *quantification* (*i.e.*, expressing data in numbers). Instead of
impressions about trends and biases, the investigator comes up with precise figures.” (pp.
170). This technique is extensively used in social research and has been widely applied to
various source materials including visual media, verbal description, personal documents,
and open-ended questionnaire and interview responses.

Berg (1995) noted that quantitative content analysis tries to identify a structure or a
pattern of regularities in the content through repetition. May (1997) also explained that
content analysis is a technique to identify the frequent occurrence of words or constructs
(or any other materials) that are used as a means of showing the characteristics in the
content. Moreover, qualitative content analysis seeks to understand the interpreting of the
themes within the text. Usually, the researchers pick out the relevant materials for
analysis, so called content code (Ericson *et al.*1991). In the phase of quantitative content
analysis, coding data may be exhausting work. Thus, setting the explicit rules or selected
criteria is the first step to consider, then, the content categories can be identified and
coded. Sommer and Sommer (1997) suggested that the best way to select categories for
classification is: (1) to skim over the material to identify major themes; (2) the themes are
listed and whenever categories begin to repeat, overlap or duplicate one another, they are
combined into categories.
In this study, content analysis was used for data coding not only from the photo-logs written by respondents, but also from the photographs taken by participants. The usefulness of content analysis in the present study can be summarized as follows: firstly the text can be coded, or broken down, into manageable categories on a variety of levels—word, word sense, phrase, sentence, or theme; secondly content analysis provides a great flexibility for choosing variables at different levels for statistical analysis of the coded form of the text; third, content analysis can allow for both quantitative and qualitative operations (Writing center, Colorado State University 2004).

**Multivariate Analysis—Biplot Technique**

As one of the Multivariate Analysis techniques, a biplot is used to provide a two-dimensional representation for a data matrix (Jobson 1991).

The great advantage of a biplot is that its components can be interpreted very easily. First, correlations among the observations are related to the angles between the vectors; second, correlations among the variables are related to the distances between the points in a biplot; third, the value or score for any observation on any variable is related to the perpendicular projection from the point to the vector (Jobson 1991).

In this study, using biplot analyzed the data that were a set of quantitative data that came from content analysis.
CHAPTER IV
THE STUDY

“If the design of public settings, such as street, parks, or recreation areas is to have visual appeal to many and diversity passers-by and users, decision makers must integrate extend knowledge of environment preferences into design.” (Nasar 1988, pp.393)

INTRODUCTION

This chapter provides details of the current study, including study area selection, participant selection, data collection and analysis. Based on the literature review, a research process was designed to employ VEP, content analysis and multivariate analysis---Biplot. Through this research process, the objectives of the current research are explored and some findings are presented in this chapter.

RESEARCH PROCESS

The scheme of the current study can be summarized as in Figure 4.1.
Study Area Selection

This study was conducted on the dill field at Mississippi State University (MSU) campus, Mississippi State, Mississippi. The dill field, considered as a major open space on campus, provides students opportunities for recreation and communication. This major open space is surrounded by several academic buildings and the spaces between buildings offer access to this major open space. In the meantime, a variety of physical landscape features, such as vegetation, water feature, sitting places and so on, are presented in these spaces. The reason of choosing this study area is that the students are familiar with and have easy accesses to this area. A study image of the drill field was obtained from the MSU website (see Figure 4.2). The red dashed line represents the boundary of the study.

Figure 4.1 Scheme of Study Process

Study Area Selection

Participant selection

Data Collection (Adaptations of VEP)

Data Coding and Analysis

Content Analysis

Multivariate Analysis---Biplot

Study Area Selection

This study was conducted on the dill field at Mississippi State University (MSU) campus, Mississippi State, Mississippi. The dill field, considered as a major open space on campus, provides students opportunities for recreation and communication. This major open space is surrounded by several academic buildings and the spaces between buildings offer access to this major open space. In the meantime, a variety of physical landscape features, such as vegetation, water feature, sitting places and so on, are presented in these spaces. The reason of choosing this study area is that the students are familiar with and have easy accesses to this area. A study image of the drill field was obtained from the MSU website (see Figure 4.2). The red dashed line represents the boundary of the study.
In the latter study, this map will be used to identify the locations using photograph taken by students.

Figure 4.2  Map of Drill Field of MSU Campus
Map Source: http://msuinfo.ur.msstate.edu/where/campusmap
**Participants Selection**

For the purpose of this research, three groups of MSU students were selected for the study, including 1) a group of American students from the landscape architecture department; 2) a group of American students with general majors; 3) a group of Chinese students with general majors. The reason for choosing the three groups of students as the public for his study are: 1) the students are major users of campus open space around the Dill Field; 2) these students represent a variety of education background; 3) these students represent different cultural background (western and eastern). Based on these participants’ inputs, the research will be able to explore the landscape preference patterns among these students for campus open space around the drill field, as well as whether these patterns were influenced by some factors, such as education, culture or gender.

**Data Collection (Adaptation of VEP)**

The VEP technique used for this study was an adaptation of methods used by Cherem(1983), Thompson(1983) and Estepa (1999). In this study, the respondents (the students) were instructed both verbally and in writing to use their own cameras and find two open spaces around the drill field on the MSU campus that they found visually appealing or positive, and then to take a photograph for each space; Photo-log sheets were provided and the respondents were asked to record in photo-log a short description of landscape features/scenes that they photographed, thus, the researcher was able to investigate why participants photographed these spaces.
An instruction sheet (see Appendix A) was provided to students in writing. The requests in the instruction include: 1. Please find 2 open space around the drill field on campus that you (respondents) find visually appealing or positive, and take a photograph for each space; 2. Please print out the photographs you (respondents) have taken in a COLOR format of 4”x6”, respectively, and attached them to the next two pages; 3. For each photograph you (respondents) have taken, describe the reason why you chose it in detail as detailed as you (respondents) can. In the literature, sending the instruction sheet was one of the modifications of VEP technique (Chenoweth 1984), in order to obtain the precision of the measurement system and interpretability of results.

Along with the instruction sheet, a survey form (see also Appendix A) was also distributed. The survey form includes some general questions regarding participants’ gender, year of birth, race, and grade-year.

The complete data collection process is summarized in Figure 4.3.

![Diagram](image)

**Figure 4.3** Data collection Procedure (Adaptation of VEP)
Data Analysis Process

After the photographs, photo-logs and survey forms were returned to the researcher, the data were summarized and 7 locations of the open space around the drill field were recoded and considered as most preferred landscape scenes. Then, Kaplan’s “information processing model” was used to investigate the most preferred landscape scene type.

Thereafter, the information from the photographs or descriptions in the photo-logs was further coded using the method of content analysis. For each location, 3 variables (Human intervention, Vegetation and Water feature) were used to measure the landscape physical features and 4 variables (Visual, Affective, Sensory and Activity) were used to measure the human perceptions of the location. This coding process was based on some criteria adapted from the published literature (Estepa 1999). In this way, the content analysis transformed these qualitative data into quantitative data for the further statistical analysis. A statistical analysis tool for multivariate analysis-Biplot was used to investigate how the landscape physical features and human perceptions contribute to the preference for each location.

The data coding and analysis process can be shown in figure 4.4.
RESULTS AND FINDINGS

Data Summary

The data for this study includes the data collected from 32 students during the pilot study from Oct. 28th to Nov. 4th in the fall semester, 2004. This group of students was from the Department of Landscape Architecture at MSU (all the participants were the Native American students, therefore, this group was called “American-LA” group in this study). The second group and third group, which includes 18 American students of general majors (called “American-G” group) and 33 Chinese students of general majors (called “Chinese-G” group), received and completed the task during the early part of the spring semester from March 1st to March 10th, 2005.

The overall responses to the VEP technique in this study are encouraging. These 83 respondents (79%) were participants out of a total 105 of students that completed the task
and returned photographs and photo-logs in time. Therefore, 166 photographs with photo-log descriptions were submitted by the participants.

Of these 83 respondents, 55 (66%) were male and 28(34%) were female. The mean age of these 83 respondents was 24 years old by the year 2005. The mean age of females was 28 years old and the mean age of males was 25 years old. The mean age of the “American-LA” group was 20 years old; the mean age of “American-G” group was 22 years old; the “Chinese-G” group had a 29-year-old mean age. The overall VEP responses are showed in the table 4.1.

Table 4.1 Results of Responding to VEP Technique

<table>
<thead>
<tr>
<th>Groups of respondents</th>
<th>Respondents</th>
<th>Photographs and Photo-logs</th>
<th>Photographs outside of study area</th>
</tr>
</thead>
<tbody>
<tr>
<td>American-LA</td>
<td>Female 8</td>
<td>64</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Male 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American-G</td>
<td>Female 5</td>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Male 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese-G</td>
<td>Female 15</td>
<td>66</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Male 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Female 28(34%) Mean age=28 year-old</td>
<td>166</td>
<td>4(2.4% of total photographs)</td>
</tr>
<tr>
<td></td>
<td>Male 55 (66%) Mean age=25 year-old</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These three groups of students were very interested in going out and taking the photographs and recording feelings about the photographs took. They were also willing to use their own cameras for the convenience of the researcher and themselves. In the literature, one of the disadvantages of VEP is that distributing the cameras to participants
is very expensive for the study. The adaptation of VEP of using their own camera to take photographs was considered successful in this study.

Furthermore, the qualities of photographs were quite good. The descriptions of photographs were also very detailed and reflected the participants’ instant feelings when they interacted with the landscape. Chenoweth (1984) pointed that the most powerful of VEP “is simply that a permanent record of subjects’ visual environment at the time of judgment is maintained- the photograph” (pp.141). According to the perception model (Zube et al. 1982), the photo-log descriptions for photographs directly reported the outcomes of their aesthetic interactions with the environment while recording the landscape properties with which they interacted.

Of a total of 166 photographs that were taken by participants, only 4 photographs (2.4%) were out of the study area. This result showed that the instruction of the study given by the researcher was quite clear for the participants.

In summary, the data collection process for this study is considered successful.

Identifications of Most Preferred Locations by Mapping

In this study, a mapping technique developed by Francis for observing the users’ activities of downtown open space and Francis (1987) for studying users’ behaviors on different types of parks (Francis 1987) was used to identify locations that were most preferred by the respondents. The mapping technique was also used by Thompson (1980) to ask subjects to identify the location and direction of each photograph taken. For each photograph, the location of the landscape scene was mapped to the map of the Drill Field.
introduced previously. One dot indicates that the open space at that location was taken once by one student. The more dots a location has indicated that this location is more preferred. As shown in Figure 4.5, we can then easily identify 7 locations that were photographed by the respondents. Therefore, these 7 locations were considered as the most preferred open space around the dill field.

1. Location 1(L1): Entrance of library
2. Location 2(L2): North of library
3. Location 3(L3): Between Union & Lee
4. Location 4(L4): Between Union & McCool
5. Location 5(L5): Between McCool, Swalm & Allen
6. Location 6(L6): Drill Filed Open Grassland
7. Location 7(L7): South of Library
Figure 4.5  Predicting the Preferred Locations by Photographs
The most preferred open space around the drill field is Location 6. Of a total of 162 valid photographs, 43 (27%) photographs were taken by participants for Location 6 and then 29 (18%) for Location 5 and 28 (17%) for Location 3. (See Table 4.2)

Table 4.2 Number of Photographs of Each Group for 7 Locations

<table>
<thead>
<tr>
<th>Locations</th>
<th>American-LA</th>
<th>Chinese-G</th>
<th>American-G</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>11</td>
<td>3</td>
<td>7</td>
<td>21 (13%)</td>
</tr>
<tr>
<td>L2</td>
<td>10</td>
<td>6</td>
<td>7</td>
<td>23 (14%)</td>
</tr>
<tr>
<td>L3</td>
<td>8</td>
<td>11</td>
<td>9</td>
<td>28 (17%)</td>
</tr>
<tr>
<td>L4</td>
<td>6</td>
<td>8</td>
<td>2</td>
<td>16 (10%)</td>
</tr>
<tr>
<td>L5</td>
<td>8</td>
<td>16</td>
<td>5</td>
<td>29 (18%)</td>
</tr>
<tr>
<td>L6</td>
<td>17</td>
<td>21</td>
<td>5</td>
<td>43 (27%)</td>
</tr>
<tr>
<td>L7</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2 (1%)</td>
</tr>
</tbody>
</table>

Categorization of Most Preferred Locations by Preference Predictors

After mapping the most preferred locations, Kaplan’s “information processing model” was used to further investigate the respondents’ photographs and photo-logs. The goal of this investigation helps understand what kinds of landscape scene types are preferred around the study area, in terms of the four predictors from Kaplan’s preference matrix (See Table 4.3).
Kaplan’s preference matrix provides four predictors for exploring the way people perceive and interpret the images: predictors of “coherence” and “complexity” are based on a two-dimension plan, which represent the ‘surface’ of picture and the perception involves a very rapid assessment of patterns; predictors of “legibility” and “mystery” are based on the three-dimensional plan, which involve the inference of what is deeper in the scene and expect the people to explore (Kaplan, Kaplan, and Ryan 1998). In result, the feelings of “coherence” and “legibility” indicate that the information presented in photographs can help to make sense of space and make it easy to understand while the feelings of “complexity” and “mystery” indicate that the information presented in photographs attract people to explore it (Kaplan, Kaplan, and Ryan 1998).

Based on this theory, the 7 locations previously identified by mapping can be categorized into 4 landscape preferred scene types: coherence, complexity, legibility and mystery (See Table 4.4). The information contained in the photo-logs (description of photographs) also helped to categorize the photographs by preference matrix.

<table>
<thead>
<tr>
<th></th>
<th>Understanding</th>
<th>Exploration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2D</strong></td>
<td>Coherence</td>
<td>Complexity</td>
</tr>
<tr>
<td><strong>3D</strong></td>
<td>Legibility</td>
<td>Mystery</td>
</tr>
</tbody>
</table>
Table 4.4 Predictors of Preference Matrix

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Definition</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coherence</td>
<td>A coherent setting is orderly, it is organized into clear area;</td>
<td>Kaplan, Kaplan, and Ryan 1998)</td>
</tr>
<tr>
<td>Complexity</td>
<td>Richness elements; different visual components; encourage exploration;</td>
<td></td>
</tr>
<tr>
<td>Legibility</td>
<td>A scene has to have some memorable components that help with orientation; easy way-finding; distinctive marks;</td>
<td></td>
</tr>
<tr>
<td>Mystery</td>
<td>Various ways that the landscape provides hints of what coming; curved path; various vegetation; blocked views;</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.5 Number of Photographs of Each Location According to Four Predictors

<table>
<thead>
<tr>
<th>Locations</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
<th>L6</th>
<th>L7</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictors</td>
<td>No. of Photographs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coherence</td>
<td>10</td>
<td>13</td>
<td>8</td>
<td>9</td>
<td>15</td>
<td>2</td>
<td>2</td>
<td>59(36%)</td>
</tr>
<tr>
<td>Complexity</td>
<td>1</td>
<td>4</td>
<td>11</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>23(14%)</td>
</tr>
<tr>
<td>Mystery</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>7(4%)</td>
</tr>
<tr>
<td>Legibility</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>2</td>
<td>9</td>
<td>41</td>
<td>0</td>
<td>73(45%)</td>
</tr>
</tbody>
</table>
The table 4.5 indicates that the most preferred scene type around the study area can be labeled as “legibility”, “coherence”, and then “complexity”. The scene type of “mystery” has the lowest preference by participants within the study area. The correlation between four predictors and seven locations can be shown in figure 4.6.

Among the 7 locations identified, location 6 has the highest frequency of photographs taken by respondents, which can also be categorized into the scene type of “legibility”. This location 6 is in the center of the drill field and it connects the entire sidewalk in the study area. This is considered the “focal point” of the study area. Its most prominent feature is a big open space with the flag pole in the middle. As described by participants in a photo-log: “the flag pole is also my favorites because of what it stands for.”

Figure 4.6  Correlation between Four Preference Predictors and 7 Locations
The flag pole has become a memorable component and distinctive landmark on the open drill field.

The second most preferred scene is location 5, which can be labeled as “Legibility” and “Coherence”. The scenes provided the information for students to understand environment and make sense for them.

In summary, with this study area, two landscape scene types “legibility” and “coherence” are most preferred, which provide information for people to understand (making sense) the environment quickly. This finding is different from the result found in “With People in Mind” by Kaplan, Kaplan, and Ryan (1998). Their finding indicates that mystery environment is more preferred. This difference is due to the fact that for campus open space, students are the primary users of this open space and they do not prefer the environment that still needs explorations. They preferred scenes that have a clear way for finding their way from one place to another so they can easily and quickly understand it and use it everyday. This explains why students preferred the “legibility” and “coherence” scene types to the “mystery” scene type on the campus open space. The examples of the scenes of four preference predicators showed in the table 4.6. (Also see the Appendix B)
### Table 4.6 Photograph Examples of Preference Predictors

<table>
<thead>
<tr>
<th>Legibility</th>
<th>Coherence</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Legibility Example" /></td>
<td><img src="image2" alt="Coherence Example" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complexity</th>
<th>Mystery</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Complexity Example" /></td>
<td><img src="image4" alt="Mystery Example" /></td>
</tr>
</tbody>
</table>

**Identification of Preferred Landscape Features**

The respondents’ photographs also contained information about the preferred landscape features in the study area. As shown in Table 4.7, a clear pattern of categories and sub-categories of preferred landscape was identified in this study though content analysis, which is consistent with findings of preferred open space features from Taylor et al (1995), Cherem and Driver (1983) and Viohl (1976) (Estepa 1999). These features
include Human Intervention, Vegetation and Water Features. For each feature, it may contain several subcategories, as shown in Table 4.7.

Table 4.7 Most Photographed Open Space Features with Sub-categories as Described by Respondents

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Intervention</td>
<td>Buildings, Paths, Walkway, Sitting area, Flag pole, Sculptures, Paving;</td>
</tr>
<tr>
<td>Vegetation</td>
<td>Trees, Flowers, Grasses, Shrubs, Brunches; Canopy, Groundcover,</td>
</tr>
<tr>
<td>Water Feature</td>
<td>Water fountain;</td>
</tr>
</tbody>
</table>

According to this categorization of open space features in the study area, the frequencies of occurrences for each feature can be counted. (See Table 4.8)

The results showed that the ‘flag pole’ in the category of ‘Human Intervention’ was the most preferred landscape feature in the study area, which supports the theory in “basic principles and elements of landscape”, “Through the use of emphasis, eye movement is directed towards a center of interest that takes a position of prominence in the landscape” (Morley, 2004). The respondents expressed positive feelings in terms of “focal point”, “connection point”, “landmark” or “patriotism”. In the “Vegetation” category, the respondents showed a strong preference of trees, especially the big trees
Table 4.8  Frequency of Landscape Features in Photographs and Photo-logs in Each Group

<table>
<thead>
<tr>
<th>Group</th>
<th>Human Intervention</th>
<th>Vegetation</th>
<th>Water feature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buildings</td>
<td>Path</td>
<td>Sitting area</td>
</tr>
<tr>
<td>American-LA</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>American-G</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Chinese-G</td>
<td>21</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>
with extended branches. These big trees provided shady places and natural feelings for students, as well as nostalgic feelings. Also, seasonal flowers are highly preferred by students since they bring a variety of color to the open space.

Identification of Preferred Human Perceptions

The content analysis of descriptions on the photo-logs in this study also indicated certain human perception patterns, which can be categorized according to the criteria introduced by Estepa (1999) as: Visual, Sensory, Activity and Affective. (The definitions and key words of these categories are summarized in Table 4.9 and Table 4.10.) Therefore, for each photo-log, the key words from each category were matched to the descriptions and the frequencies of occurrences in each category were counted. These categories can also be used to explain why the respondents prefer certain landscape scene types.

The result showed that in the visual category, words such as, “color, view, shade, focal point” were used many times; in the sensory category, words such as, “security, oriented, seclusion” occurred frequently; in the activity category, words such as, “walking, sitting” were repeated. In the affective category words such as, “calmness, safe, pleasing” were used a lot. Thus these words can be sorted in the sub-categories (see Table 4.10).

The results also showed that visual perception was dominant for the campus open space. The feeling of “color”, “focal point” echoes with the findings in previous sections.
Table 4.9  Photo-log Content Analysis Categories – Definitions and Sources  
(Estepa 1999)

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>Pertaining to, resulting from, or serving the sense of sight</td>
<td>Deardon (1976)</td>
</tr>
<tr>
<td>Sensory</td>
<td>Conveying or producing sense impulses</td>
<td>Cherem &amp; Driver(1983)</td>
</tr>
<tr>
<td>Activity</td>
<td>Abounding in or exhibiting action</td>
<td>Viohl(1976)</td>
</tr>
<tr>
<td>Affective</td>
<td>Pertaining to or arising from feeling or emotional reaction</td>
<td>Pei(1997)</td>
</tr>
</tbody>
</table>

Table 4.10  Photo-log Content Analysis Categories with Sub-categories as Described by Respondents

<table>
<thead>
<tr>
<th>Category</th>
<th>Key words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>Color, Contrast, View, Shade, Variety, Open, Size, focal point</td>
</tr>
<tr>
<td>Sensory</td>
<td>Sound, Quiet, Cool, Warm, Texture (Patterns), Security, Seclusion, Balance, uniform, oriented</td>
</tr>
<tr>
<td>Activity</td>
<td>Walking, Sitting, Studying, Relaxing, Playing</td>
</tr>
<tr>
<td>Affective</td>
<td>Peaceful, Calm, Safe, Welcome, Pleasant, Interesting, Cozy, Freedom, comfortable, mystery, Naturalistic, Nostalgic, Patriotic</td>
</tr>
</tbody>
</table>

Identification of Overall Preference Pattern

As discussed in the previous sections, through the content analysis, the qualitative descriptions in the photographs and photo-logs from VEP responses have transformed
into quantitative data. Three prominent landscape features (Human Intervention, Vegetation and Water Feature) and four human perception categories (Visual, Affective, Sensory and Activity) have been identified for each preferred location, which can be considered as 7 variables for measurements of a landscape scene. Therefore, it is possible to explore the preference patterns among the respondents in the study area. To achieve this goal, a statistical analysis tool for multivariate analysis-Biplot can be applied. In this study, 6 preferred locations\(^2\) were considered as observations and were measured by 7 variables. The data then was constructed into a preference data matrix and the Biplot technique can be used to clearly demonstrate how these measurements are contributing to the preference of each location (preference pattern).

The Biplot technique was applied to the overall preference data matrix as shown in Table 4.11. The Multivariate Dimensional Preference (MDP) analysis result was presented using a Biplot in Figure 4.7.

\(^2\)Although there were 7 locations initially identified as most preferred scenes in the study area. Due to the sparseness of the data for location 7, it was excluded from the analysis for simplicity.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Human Intervention</th>
<th>Vegetation</th>
<th>Water Feature</th>
<th>Visual</th>
<th>Sensory</th>
<th>Activity</th>
<th>Affective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1 (18photos, 11% of total)</td>
<td>16</td>
<td>20</td>
<td>0</td>
<td>22</td>
<td>6</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>L2 (24photos, 15% of total)</td>
<td>21</td>
<td>29</td>
<td>11</td>
<td>22</td>
<td>19</td>
<td>11</td>
<td>30</td>
</tr>
<tr>
<td>L3 (30photos, 19% of total)</td>
<td>20</td>
<td>32</td>
<td>0</td>
<td>29</td>
<td>10</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>L4 (16photos, 10% of total)</td>
<td>15</td>
<td>12</td>
<td>12</td>
<td>13</td>
<td>10</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>L5 (28photos, 17% of total)</td>
<td>22</td>
<td>31</td>
<td>0</td>
<td>28</td>
<td>19</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>L6 (44photos, 27% of total)</td>
<td>44</td>
<td>27</td>
<td>0</td>
<td>49</td>
<td>23</td>
<td>9</td>
<td>24</td>
</tr>
</tbody>
</table>

Note: The total number of valid photograph is 162;
As shown in Figure 4.7, Location 1, 3, 5 & 6 demonstrate some similarity in term of preference pattern among all locations. The variables of “Visual”, “Vegetation”, and “Human Intervention” strongly contribute to this pattern. Location 1 was located in the front of the library. The annual flowers brought the “color” to this area and the “steps” at
the entrance provide seating places for students for relaxing. Location 3 is open space around the buildings of “Union” and “Lee hall”. The “old oak tree” and “annual flowers” were the most prominent features for this location. This space also provides students a pleasant “sitting area” for recreation. Location 5 is the open space around the building of “Swalm”, “Allen Hall” and “McCool”. The most notable landscape feature in this location was the small “woodland” and “smooth grassland ground” underneath the spread trees. As previously discussed, Location 6 is the major open space on drill field. Its “openness” and function of “focal point” for visual pleasance significantly contributed to its preference by respondents.

The variable of “Activity” strongly contributes to the preference of location 4, which represents the space between the buildings of the Union and McCool. The most distinguished features for this location are the “water fountain” and the “seating place”. This place was considered a pleasant gathering place around the drill field: “studying”, “relaxing”, and “playing” were the major activities that participants described in this place.

The variable of “Sensory” is the most significant variable that contributes to the preference for location 2. This location represents the open space in the north of library with seating areas and the small water fountains in it. With rich vegetation surrounding this space and two big trees forming the tunnel-like passage to the library or to the drill field, this location was described as a “secluded space”, “private space” or “quiet space” by respondents.
Comparisons of Preference Patterns between Groups

In the literature, researches have shown that factors such as gender, education and culture can affect people’s preference for a landscape scene. Therefore, in this study, the overall preference data matrix was divided into groups by gender, education and culture. The preference patterns between groups were then demonstrated using Biplots.

Preference Pattern Influenced by Gender

The preference patterns between the female and male students were analyzed according to Table 4.12 and the MDP analysis result were presented using two Biplots in Figure 4.8 and Figure 4.9.

The result in Figure 4.8 and Figure 4.9 indicated a different preference pattern between the female and male students.

For the female students, Location 1, 2, 5 & 6 demonstrate a similarity in preference. The preferences for these locations were highly influenced by “Vegetation”, “Human Intervention”, “Affective”, “Sensory” and “Activity” elements. Although Location 4 was also influenced by “Vegetation”, “Human Intervention”, “Affective”, “Sensory” and “Activity” elements, the “Water Feature” distinguished it from location 1, 2, 5 & 6. For location 3, the variable of “Visual” distinguished it from all other locations.
Table 4.12  Data Matrix of 7 Locations with Different Gender

<table>
<thead>
<tr>
<th>Locations</th>
<th>Variables</th>
<th>Human Intervention</th>
<th>Vegetation</th>
<th>Water Feature</th>
<th>Visual</th>
<th>Sensory</th>
<th>Activity</th>
<th>Affective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Frequency of occurrence both in Photographs and photo-logs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>Female (5photos)</td>
<td>5</td>
<td>6</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>L1</td>
<td>Male (14photos)</td>
<td>11</td>
<td>14</td>
<td>0</td>
<td>18</td>
<td>4</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>L2</td>
<td>Female (8photos)</td>
<td>7</td>
<td>9</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>L2</td>
<td>Male (13photos)</td>
<td>14</td>
<td>20</td>
<td>9</td>
<td>16</td>
<td>14</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>L3</td>
<td>Female (8photos)</td>
<td>6</td>
<td>10</td>
<td>0</td>
<td>12</td>
<td>2</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>L3</td>
<td>Male (19photos)</td>
<td>14</td>
<td>22</td>
<td>0</td>
<td>17</td>
<td>8</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>L4</td>
<td>Female (7photos)</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>L4</td>
<td>Male (8photos)</td>
<td>9</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>5</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>L5</td>
<td>Female (11photos)</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>9</td>
<td>8</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>L5</td>
<td>Male (17photos)</td>
<td>12</td>
<td>21</td>
<td>0</td>
<td>19</td>
<td>11</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>L6</td>
<td>Female (13photos)</td>
<td>13</td>
<td>10</td>
<td>0</td>
<td>16</td>
<td>9</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>L6</td>
<td>Male (25photos)</td>
<td>31</td>
<td>17</td>
<td>0</td>
<td>33</td>
<td>14</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>L7</td>
<td>Female (2photos)</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>L7</td>
<td>Male (0photo)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Notes: 1. The total number of valid photographs is 162;
2. The total number of female is 28;
3. The total number of male is 55.
Figure 4.8 Preference Pattern of Female

Figure 4.9 Preference Pattern of Male
For the male students, location 1, 3, 5 & 6 were very similar, which were strongly influenced by “Vegetation”, “Human Intervention” and “Visual” components. Location 2 distinguishes itself through variables of “Affective” and “Sensory” and location 4 distinguished itself through the variable of “Activity” from other locations. And it is also noted that the preference pattern for the male students was similar to the overall preference pattern. This similarity may be due to fact that the male students (55 students) constitute the majority of overall respondents compared with only 28 female respondents.

Notice that the variable “Activity” has significantly contributed the preference pattern for the female students, which frequently considers these locations as the places for “meeting friends” and “resting”. The different preference pattern between the female and male students in this study also partially support the argument by Hutchison (1994) in a study of public parks, which showed that women were more likely than men to be engaged in social activities. Men were more likely involved in mobile activities such as sports and walking.

**Preference Pattern Influenced by Cultural Background**

In this study, the overall preference data matrix was also divided in to student groups with two different cultural backgrounds: Chinese students and American students. The preference patterns between these two groups were analyzed according to Table 4.13 and the MDP analysis result were presented using two Biplots in Figure 4.10 and Figure 4.11.
### Table 4.13 Data Matrix of 7 Locations with Different Cultural Background

<table>
<thead>
<tr>
<th>Locations</th>
<th>Variables</th>
<th>Human Intervention</th>
<th>Vegetation</th>
<th>Water Feature</th>
<th>Visual</th>
<th>Sensory</th>
<th>Activity</th>
<th>Affective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency of occurrence both in Photographs and photo-logs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>Chinese (1 photo)</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>American (17 photos)</td>
<td>14</td>
<td>17</td>
<td>0</td>
<td>20</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>L2</td>
<td>Chinese (6 photos)</td>
<td>3</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>American (18 photos)</td>
<td>18</td>
<td>21</td>
<td>9</td>
<td>20</td>
<td>15</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>L3</td>
<td>Chinese (13 photos)</td>
<td>8</td>
<td>12</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>American (17 photos)</td>
<td>12</td>
<td>20</td>
<td>0</td>
<td>24</td>
<td>6</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>L4</td>
<td>Chinese (8 photos)</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>American (8 photos)</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>L5</td>
<td>Chinese (16 photos)</td>
<td>12</td>
<td>16</td>
<td>0</td>
<td>13</td>
<td>9</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>American (12 photos)</td>
<td>10</td>
<td>15</td>
<td>0</td>
<td>15</td>
<td>10</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>L6</td>
<td>Chinese (21 photos)</td>
<td>19</td>
<td>11</td>
<td>0</td>
<td>19</td>
<td>15</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>American (23 photos)</td>
<td>25</td>
<td>16</td>
<td>0</td>
<td>30</td>
<td>8</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>L7</td>
<td>Chinese (0 photo)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>American (2 photos)</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Notes:
1. The total number of valid photograph is 162;
2. American students (50 students) includes “American-LA” group and “American-G” Group;
3. The 33 participants are Chinese.
Figure 4.10 Preference Pattern of Chinese

Figure 4.11 Preference Pattern of American
As shown in Figure 4.10 and Figure 4.11, the MDP analysis results showed different landscape preference patterns between Chinese students and American students.

For Chinese students, location 4 and 6 displayed a similarity through the variable of “Human Intervention”. Location 1 and 2 were similar through the variable “Vegetation”. Overall, “Human Intervention” and “Vegetation” were two important variables that contribute to the Chinese students’ preference pattern.

For American students, Location 1, 3, and 6 were very similar to each other through the variables of “Vegetation” and “Visual”. Overall, “Vegetation” and “Visual” elements were two important variables that contribute to the American students’ preference pattern.

This result can be further explained by the fact that both of Chinese and American participants preferred the “trees” that belonged to the “Vegetation” category on campus open space while the Chinese students’ preference pattern was highly influenced by the element of “buildings” which belongs to the “Human Intervention” category. The different building styles on the MSU campus from those of China strongly attract the Chinese students. This result partially support the finding of Berlyner’s (1972) that people prefer relative novelty to familiarity.

**Preference Pattern Influenced by Educational Background**

In this study, the overall preference data matrix was also divided into student groups of different educational background: students major in landscape architecture (LA major group) and students with general majors (General major group).
Table 4.14  Data matrix of 7 Locations with Different Educational Background

<table>
<thead>
<tr>
<th>Locations</th>
<th>Variables</th>
<th>Human Intervention</th>
<th>Vegetation</th>
<th>Water Feature</th>
<th>Visual</th>
<th>Sensory</th>
<th>Activity</th>
<th>Affective</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>LA (1 photo)</td>
<td>6</td>
<td>9</td>
<td>0</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>General (17 photos)</td>
<td>10</td>
<td>11</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>L2</td>
<td>LA (6photos)</td>
<td>11</td>
<td>11</td>
<td>4</td>
<td>14</td>
<td>11</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>General (18photos)</td>
<td>10</td>
<td>18</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>L3</td>
<td>LA (13photos)</td>
<td>5</td>
<td>11</td>
<td>0</td>
<td>16</td>
<td>4</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>General (17photos)</td>
<td>15</td>
<td>20</td>
<td>0</td>
<td>13</td>
<td>6</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>L4</td>
<td>LA (8photos)</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>General (8photos)</td>
<td>8</td>
<td>18</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>L5</td>
<td>LA (16photos)</td>
<td>7</td>
<td>9</td>
<td>0</td>
<td>9</td>
<td>7</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>General (12photos)</td>
<td>15</td>
<td>22</td>
<td>0</td>
<td>19</td>
<td>12</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>L6</td>
<td>LA (21photos)</td>
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<td>21</td>
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<td>9</td>
</tr>
<tr>
<td></td>
<td>General (23photos)</td>
<td>24</td>
<td>19</td>
<td>0</td>
<td>28</td>
<td>20</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>L7</td>
<td>LA (0photo)</td>
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<td>4</td>
<td>0</td>
<td>2</td>
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<tr>
<td></td>
<td>General (2photos)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Notes: 1. The total number of valid photograph is 162;  
2. “LA” represents the Landscape Architecture Major participants (32 students); “General” represents the General Major participants (51 students), including “Chinese-G” Group and “American-G” Group;
The preference patterns between these two groups were analyzed according to Table 4.14 and the MDP analysis result were presented using two Biplots in Figure 4.12 and Figure 4.13.

The Biplots in Figure 4.12 and Figure 4.13 clearly showed that the preference patterns between the LA group and the General group are different.

The most significant difference that these 2 groups have different sensitivities to landscape features. With the special training in landscape architecture, the LA group can be considered as an “expert” group, which can clearly distinguish their preference toward a landscape scene in terms of one or more variables. However, the preference pattern of the General group is usually a mixed contribution of several variables. For example, for the LA group, the preference toward Location 1, 2, 3 and 5 was dominant by the variable of “Vegetation”, the preference toward Location 4 was dominant by the variables of “Water Feature” and “Activity”, and the preference toward Location 6 was dominant by the variables of “Visual”, “Affective” and “Sensory”; for the General group, the variable of “Visual” and “Affective” appear to have dominant contributions for preference toward all locations.

The finding here supports the assumptions of Craik (1972) and Robinson et al. (1976) that lay public can only express aesthetic preference which are deemed to be idiosyncratic, arbitrary, and not free from emotive and associational influences as well as the suggestion from Carlson (1982) that public lacks the experience and knowledge required to be fully sensitive to aesthetic quality.
SUMMARY

The primary objective of this study was to identify landscape preference pattern on campus open space around the dill field at Mississippi State University. The study investigated whether the landscape preferences pattern whether was influenced by gender, educational and cultural background. Based on the primary objectives, the study employed Visitor Employed Photography as the major data collection method combined with the methods of content analysis and statistics analysis. Three groups of students (83) participated in the study in which a group of American students (32) were from landscape architecture department, a group of American students (18) of general majors studied in Mississippi State University and a group of Chinese students (33) of general majors. The open space on campus around dill field at the Mississippi State University was selected as study area due to the convenient access and the everyday experience to students. With the distributed instruction sheets and survey forms, each participant photographed two open spaces that he (she) found visually appealing or positive, then participants recorded the reason why they preferred the certain spaces on photo-logs. By applying the VEP method to this study, the photographs taken by participants and the photo-logs provided rich and valid data for analysis.

Using mapping techniques, the preferred open spaces (7 locations) were identified by the photographs taken by participants. Based on the criteria of former research, the landscape features on open space around dill field were identified by content analysis both from photographs and photo-logs. According to the photographs, the most preferred landscape feature on campus open space by participants was identified and the most
preferred spatial organization was identified according to the preference matrix (Kaplan, Kaplan and Ryan 1998). A content analysis of photographs categorized the most photographed campus landscape features into “Human Intervention”, “Vegetation”, and “Water Features” categories. According to the written descriptions, a content analysis of the photo-logs categorized descriptions into four categories which was “Visual”, “Activity”, “Affective”, and “Sensory”.

Based on the content analysis, the qualitative data were transformed to quantitative data that the multivariate-Biplot (statistical analysis) could be applied to investigate the landscape preference pattern of seven identified open spaces around the dill field. The landscape preference pattern was identified. Furthermore, the study found that the landscape preference pattern differed by gender, educational background and cultural background.
CHAPTER V

CONCLUSIONS, LIMITATIONS
AND RECOMMENDATIONS

INTRODUCTION

Through the study conducted in Chapter IV, this chapter will draw the conclusions for the present landscape preference study for campus open space around the drill field at Mississippi State University. The limitations of the current study and recommendations for future study will also be discussed in this chapter.

CONCLUSIONS

The current study is an empirical study of landscape preference for campus open space. Through the research process designed in Chapter IV, the methods of VEP, content analysis and statistical multivariate analysis-Biplot were successfully applied to explore the most preferred landscape scene type and preference patterns among 83 students in the study area of the drill field at Mississippi State University. The findings and conclusions in this study include:

1. As one of the research objective, the Visitor Employed Photography (VEP)
method was used as a dominant data collection method in this study to explore the applicability of the VEP method for landscape preference study. The responses of the VEP method include photographs and photo-logs, which effectively reflect the participants’ perceptions toward a landscape scene. Through the content analysis, the qualitative information contained in photographs and photo-logs can be transformed into quantitative data for further statistical analysis. Therefore, this study found that the VEP method is an efficient method for landscape preference study.

2. In this study, the Kaplan’s “information processing model” was used to identify the most preferred landscape scene type on campus open space. The results from this study indicated that the landscape scene types of “legibility” and “coherence” are most preferred on campus open space, which is different from the findings of Kaplan and Kaplan (1989). Kaplan and Kaplan found that the highly preferred the spatial organization of landscape scenes were the “complexity” and “coherence”, as well as mystery in the natural environment. The scene types of “legibility” and “coherence” provide information to meet students’ needs, such as visual attractive, the way finding, and the order of landscape. Therefore, landscape scene types of “making sense” instead of “exploring” are more preferred on campus open space.

3. Through the content analysis in this study, a preferred landscape scene was measured by three variables of landscape features: “Human Intervention”, “Vegetation” and “Water Feature” and four variables of human perception categories: “Visual”, “Sensory”, “Activity” and “Affective”. A landscape
preference pattern presented using a Biplot can easily demonstrate how these measurements are contributing to the preference of a landscape scene. The result from the current study indicates that “Vegetations” including tree, seasonal flowers and open grassland, are the most preferred landscape feature on campus open space around dill field at Mississippi State University. This result agrees with the finding of Kaplan, Kaplan and Ryan (1998) that the scene of “spaced trees and smooth ground” is highly preferred by people. As also pointed out by many other researchers (see Wohlwill 1976, Ulrich 1983, Herzog 1984, Kaplan and Kaplan 1989), this study found that people preferred the natural settings to the built environment. Therefore, the natural landscape features and settings should be considered as an important issue for landscape design and management of campus open space.

4. Also this study found that factors such as gender, educational and culture background highly influenced the landscape preference patterns among groups of students. The female students’ perceptions toward a landscape scene seem to be highly influenced by its visual components while the male students perceptions seem be highly influenced by the combination of “Visual”, “Vegetation” and “Human Intervention” components. The Chinese students’ perceptions were strongly influenced by the “Human Intervention” components while the American students’ perceptions were strongly influenced by the “Vegetation”. This finding seemed to support the assumption of Berlyne’s study that people prefer relative novelty to familiarity (Nasar 1988). This study also found that people’s
knowledge of landscape architecture can significantly affect the landscape preference pattern. The participants with landscape architecture education (experts) are more sensitive to the landscape features therefore they are able to distinguish their preference toward a landscape scene in terms of certain landscape features. On the other hand, the participants without landscape architecture education (non-experts) tend to define or express their preference arbitrarily. This finding support Kaplan and Kaplan’s (1982) argument that landscape designers or planners with early trainings can achieve a high level of consensus for the surrounding environment. Therefore, the preference pattern of the experts in landscape architecture is significantly different from that of the lay public. Since the public input is valuable and should be considered in the landscape design and management, the preference study of a landscape should include the public participants and more attention and instructions should be given in order to make the study manageable.

LIMITATIONS

Sample Size

In this study, only 83 students responded to the VEP method and only 162 valid photographs were analyzed. Compared to other preference studies (Cherem 1973), 221 hikers’ (10 photographs by one subject) perception of trail environment, the sample size in this study was relatively small. The sample size caused the sparseness in the preference data matrix, especially when the overall data was divided into groups for studying the
effects of gender, educational background and cultural background, which in turn brought certain difficulties and limitations to further statistical research. Furthermore, the analysis in this study also encountered difficulties due to the unbalanced sample sizes in different groups.

Survey Time

The data for this study were collected in two different time periods. The landscape architecture major students responded to VEP in the later part of the winter semester. The general major students including American and Chinese conducted the study in the early part of the spring semester. Even though Mississippi State University is located in the south of The United States and the climates did not change dramatically over the study period, it is suspected that the seasonal influences, such as the color and view, did affect the respondents’ preferences towards the open space around the study area.

VEP Method

Although the VEP method was successfully applied for the preference study of campus open space, some of its limitations were observed in this study. The interpretations of the VEP responses were highly subjective. Therefore, the results may be heavily influenced by the knowledge and preference of the researcher. Furthermore, to get actual participant’s perceptions toward a landscape scene, the VEP method recommended that the researcher should not give too many instructions to participants. Since the public may not be fully sensitive to the surrounding environment and may express aesthetic preferences idiosyncratically, arbitrarily and emotionally (Craik 1972),
the responses from the VEP may not be easily managed for research purposes and limit its application in the preference study. Another limitation of the VEP technique is that the subjects may interfere with the interaction of the landscape. The subjects using the camera to frame the landscape scenes and features may not view the environment normally (Chenoweth 1984). Furthermore, through the camera, the subjects may take the landscape features and scenes that were easily framed or nearby landscape rather than what they preferred.

**Some Other Limitations**

The users of the campus should include the students, as well as the faculty and the staff of the university. Due to the limitation of time and resources, the participants in this study only included a small portion of the students at Mississippi State University. This limitation may cause some bias in the analysis.

Due to the limitation of time and resources, the responses from the VEP method were not completed with follow-up questionnaires. The full meanings of photographs from the respondents were not completely recovered.

In addition, the language may cause the bias to the preference study of Chinese students group. Since English is not their native language, some Chinese students record the feeling in Chinese and some in English. The usage of non-native language may affect the reliability of the descriptions in the photo-logs.
RECOMMENDATIONS FOR FUTURE RESEARCH

This study is an empirical study of campus open space preference studies, aiming to enrich the current landscape preference study body. Through this study, recommendations for future landscape preference studies include:

1. The research process designed in this study is suitable for any other landscape preference studies that want to adopt the VEP method. Certain appropriate modifications can be made to fit the specific research need and research depth.

2. The VEP method should be combined with other survey techniques in order to make the process of transforming qualitative information into quantitative data more manageable. Using ranking and scaling methods on certain landscape features may contribute to the objectivity and stability of the statistical analysis results.

3. If the research interest of a landscape preference study involves the lay public, some carefully designed instructions may help to manage the responses from the participants toward the research objectives.

4. Some other statistical analysis methods or tools need to be further explored for their applicability to meet certain research needs and depths.
BIBILOGRAPHY


http://students.ed.uiuc.edu/lin8/edpsy490i/content_analysis


APPENDIX A

SURVEY FORM, VEP INSTRUCTIONS

AND SAMPLE PHOTO-LOG
Part I: Instructions and Survey Form

1. **Title of study:** A Landscape Preferences Study of Campus Open Space

2. **Purpose of this study:**
   This project will study different preference patterns for open space around the drill field of MSU campus among two different groups of students; landscape architecture majors, and the general student population.

3. **Result from this study:**
   The results from the study will be used as a good indication of effect of Landscape Architecture Education on students’ preference on campus open space.

3. **Participate**
   You are being asked to volunteer to participate in this study. Participants will receive extra 5 credit points on your final average for LA1803. You may withdraw at any time and refuse to answer any specific question. If you have any question about this study, please contact Ying Zhang at 662-3256828 or email: yz126@msstate.edu ; also you can contact Professor Jim Clark at 662-3125588 or email: jdc2@ra.msstate.edu . Finally, if you are not over 18 years old, you cannot participate.

4. **Procedure**
   You will follow the instructions provided by investigator to use cameras (provided by investigator) to take 2 photographs of their favorite 2 open spaces around the drill field at MSU campus, and write the description on the photo-log (provided by investigator) and the reason why you choose these two open spaces. You may use your own camera if desired.

If you agree to participate as a volunteer, please sign you name:

Signature: ___________________________  Date: ___________________________

Figure A.1  Human Subject Research Form
Participant #: ______________________________________

Gender: ( ) Male    ( ) Female

Race:  ( ) White Caucasian ( ) Black  ( ) Hispanic ( ) Asian

( ) Other (specify ______________________)

Year of Birth___________________________________

Major:________________________________________

You are: ( ) Freshman ( ) Sophomore ( ) Junior ( ) Senior ( ) Graduate

Are you a transfer student? ( ) Yes    ( ) No

Instructions of Task:

1. Please find two open spaces around the drillfield on campus that you find visually appealing or positive, and take a photograph for each space.

2. For each photograph you have taken, describe the reason why you chose it in as much details as possible.

Figure A.2  Sample Survey Form
Part II. Photo-Log

Photograph 1:

Please Paste the Photograph Here

Description in detail what you find appealing about the features of the scene that has been photographed.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Figure A.3   Sample of Photo-Log Sheet 1
Photograph 2:

Please Paste the Photograph Here

Description in detail what you find appealing about the features of the scene that has been photographed.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Figure A.4  Sample of Photo-Log Sheet 2
January 31, 2005

Ying Zhang
27P Wallace Circle
Starkville, MS 39759

Re: IRB Docket #05-010: A Study of the Preferences for Open Space around the Drill Field of MSU Campus

Dear Mr. Zhang:

The above referenced project was reviewed and approved via administrative review on January 31, 2005 in accordance with 45 CFR 46.101 b(1). Continuing review is not necessary for this project. However, any modification to the project must be reviewed and approved by the IRB prior to implementation. Any failure to adhere to the approved protocol could result in suspension or termination of your project. The IRB reserves the right, at anytime during the project period, to observe you and the additional researchers on this project.

Please refer to your IRB number (#05-010) when contacting our office regarding this application.

Thank you for your cooperation and good luck to you in conducting this research project. If you have questions or concerns, please contact me at tarwood@research.msstate.edu or 325-3294.

Sincerely,

R. Dwight Hare
Chair

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Figure A.5  IRB Approval Letter
APPENDIX B

SAMPLES OF DATA SET
Figure B.1  Sample of VEP Response (LA Major, American Respondent Sample 1)
Figure B.2 Sample of VEP Response (LA Major, American Respondent Sample 2)
Figure B.3  Sample of VEP Response (LA Major, American Respondent Sample 3)
Figure B.4 Sample of VEP Response (LA Major, American Respondent Sample 4)

Description stating in detail what you find appealing about the features of the scene that has been photographed.

The walking leads up to the centerpiece statue, and then pulls you out to the side where the buildings on the left get in. Either way your eye moves to the tree pulls you back to the statue. It's interesting also because you can just see a little of the background off to the distance. The pulls your back a little when you first see it, when you get past the foreground.

The tree in the center has such a short main trunk, and then puts you right into the path where the branches and can pull your eyes anywhere in the picture plain. The one in the background was interesting and the people on the left side of the picture made a nice running path back to the picture left. The overall arrangement is surrounded by very interesting and has a lot of color. I think the most intriguing part of the picture is the open doorway in the side of the wall under the statue. The lines around it is neat, but it is kind of dark so it doesn't draw you in as very interesting.
Description stating in detail what you find appealing about the features of the scene that has been photographed:

This scene is the flagpole in front of the Schwarm building on the South end of the drill field. It represents a focal point for the South end of the field, and I think this is a very appealing space in how it is centered with the building and that it is a centralized seating area. For students on this end of the field, the brick work leading up to the flagpole is also appealing - on the base of the bricks are names of those who have passed away over the years.

This photograph is of the statue in front of Lee Hall. I find this scene appealing in that the flagpole serves as a focal point for the North end of the drill field. Also, the pavers around the space add interest to the space instead of concrete, like the flagpole. It serves as a central and open space for students to socialize and sit on the North end.
Figure B.6  Sample of VEP Response (LA Major, American Respondent Sample 6)
Figure B.7  Sample of VEP Response (General Major, American Respondent Sample 1)

Description in detail what you find appealing about the features of the scene that has been photographed.

I chose this place in the drill field because it is pedestrian friendly. I love to sit here between classes. I like the use of water in this space. It creates a soothing atmosphere for everyone who passes by. It also has plenty of space for seating. I personally think that this particular spot is the most visually appealing.

I also enjoy this space that is located in front of the library. I love this spot because it is shady and has a good breeze. The tree is beautiful and old and perfect to sit under and read. I also love the mixture of soft clover and grass. It makes me feel like a kid playing in the yard.
Figure B.8  Sample of VEP Response (General Major, American Respondent Sample 2)

I chose this site primarily because it is picturesque and it evokes a feeling of freedom and adventure. The sky is clear and the trees are tall, creating a sense of openness and tranquility. The building in the background adds a sense of grandeur and history.

The colors in the scene are vibrant and contrasting, with the green of the trees and the blue of the sky creating a visually appealing composition. The lighting is natural, casting soft shadows and highlighting the details of the landscape.

I decided to include the library as it is a focal point and provides the perfect contrast between the natural elements and the man-made structure. The design of the library is both functional and aesthetically pleasing, with its clean lines and modern architecture.

The trees were also placed strategically in order to add depth and create a balanced composition. The overall effect is one of harmony and serenity, making this scene a perfect representation of the VEP Response.
Figure B.9 Sample of VEP Response (General Major, American Respondent Sample 3)
Figure B.10  Sample of VEP Response (General Major, American Respondent Sample 4)
Figure B.11  Sample of VEP Response (General Major, American Respondent Sample 5)
Figure B.12 Sample of VEP Response (General Major, American Respondent Sample 6)
Figure B.14  Sample of VEP Response (General Major, Chinese Respondent Sample 2)
Description in detail what you find appealing about the features of the scene that has been photographed.

Wide open space, look comfortable.
Figure B.16  Sample of VEP Response (General Major, Chinese Respondent Sample 4)
Figure B.17  Sample of VEP Response (General Major, Chinese Respondent Sample 5)
Figure B.18  Sample of VEP Response (General Major, Chinese Respondent Sample 6)